United States
Department of
Agriculture

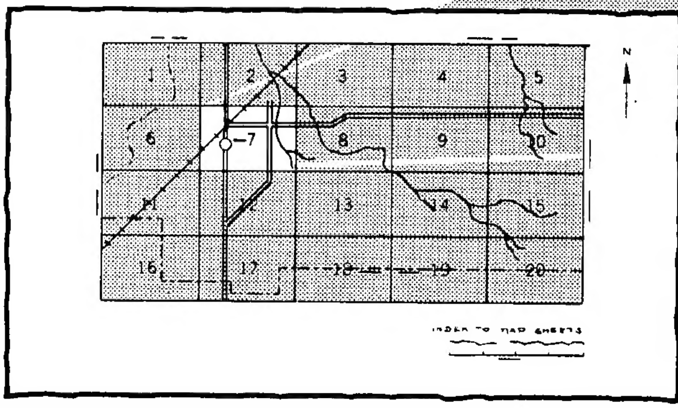
Soil
Conservation
Service

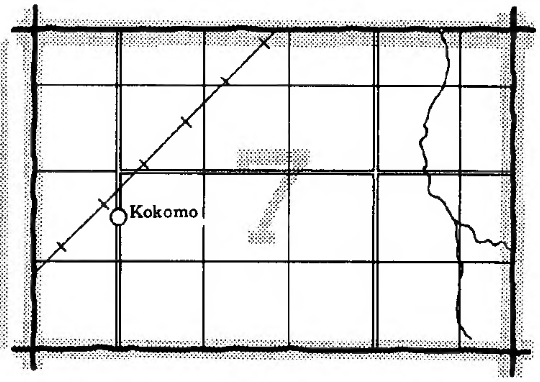
In cooperation with
Virginia
Polytechnic
Institute and
State University

Soil Survey of Middlesex County, Virginia

HOW TO USE

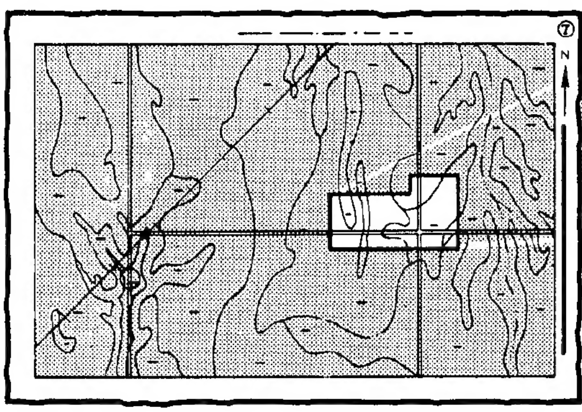
1. Locate your area of interest on the "Index to Map Sheets"

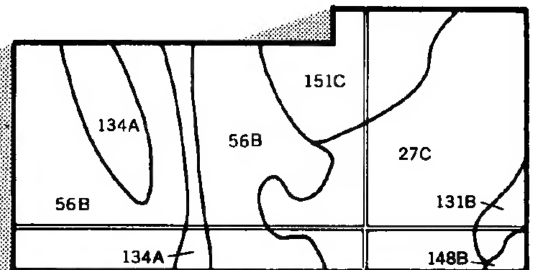




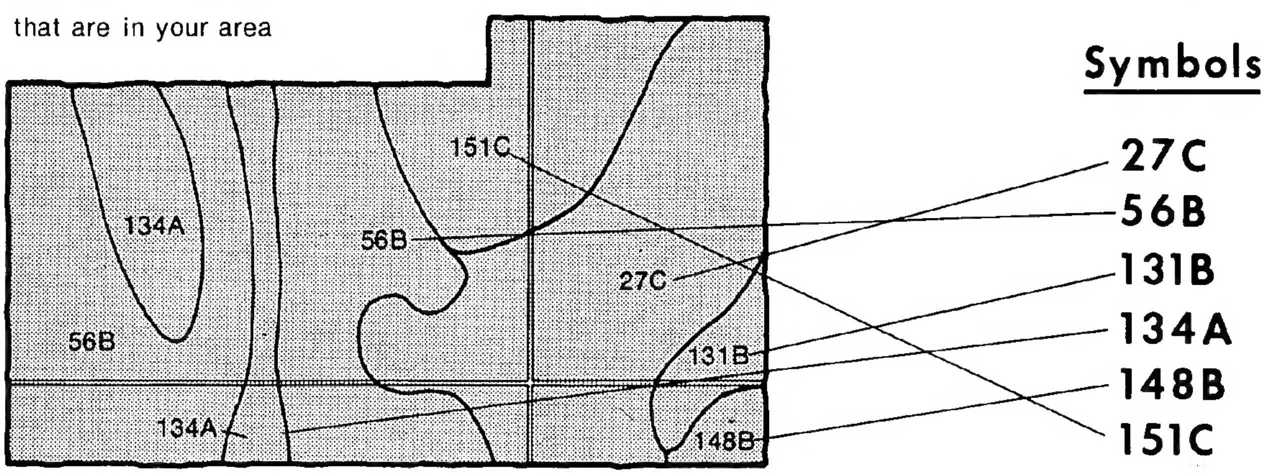
2. Note the number of the map sheet and turn to that sheet.

3. Locate your area of interest on the map sheet.



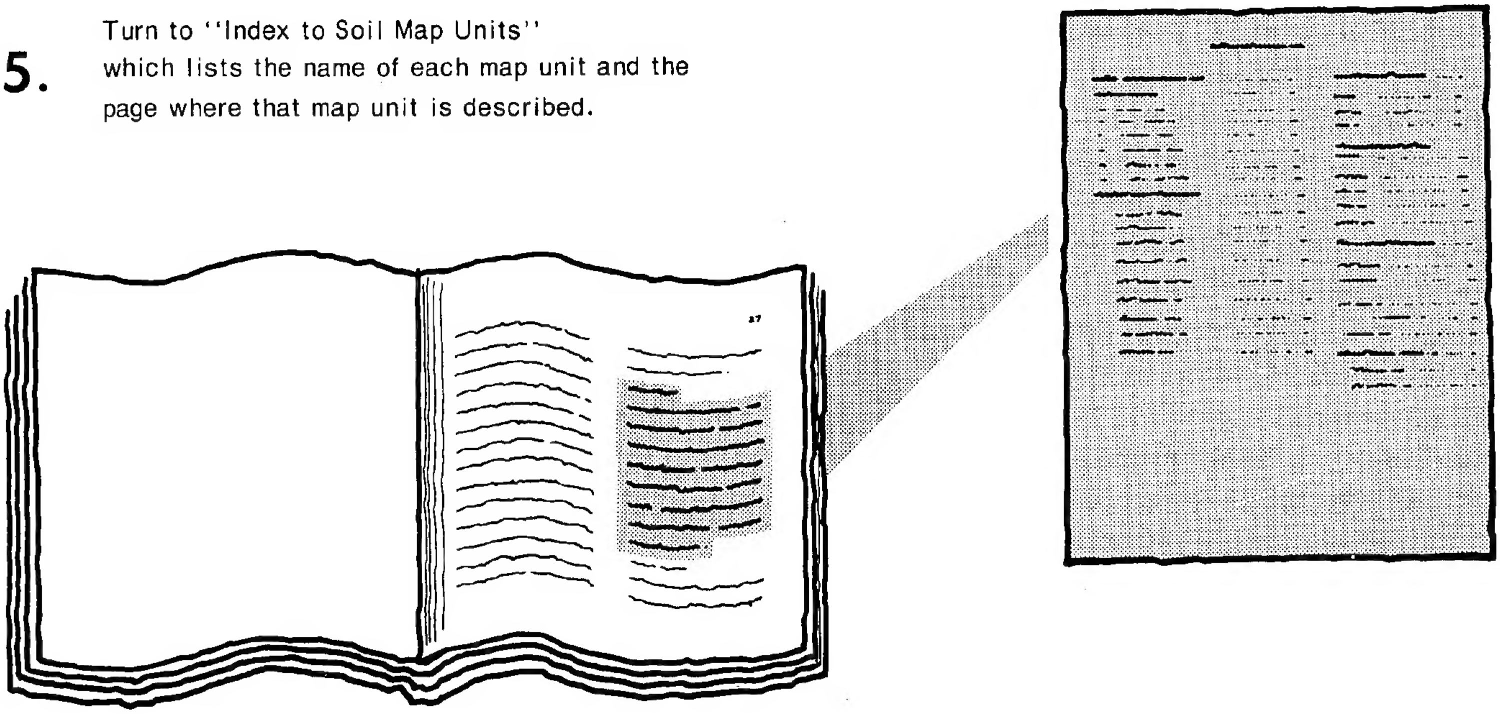


4. List the map unit symbols that are in your area

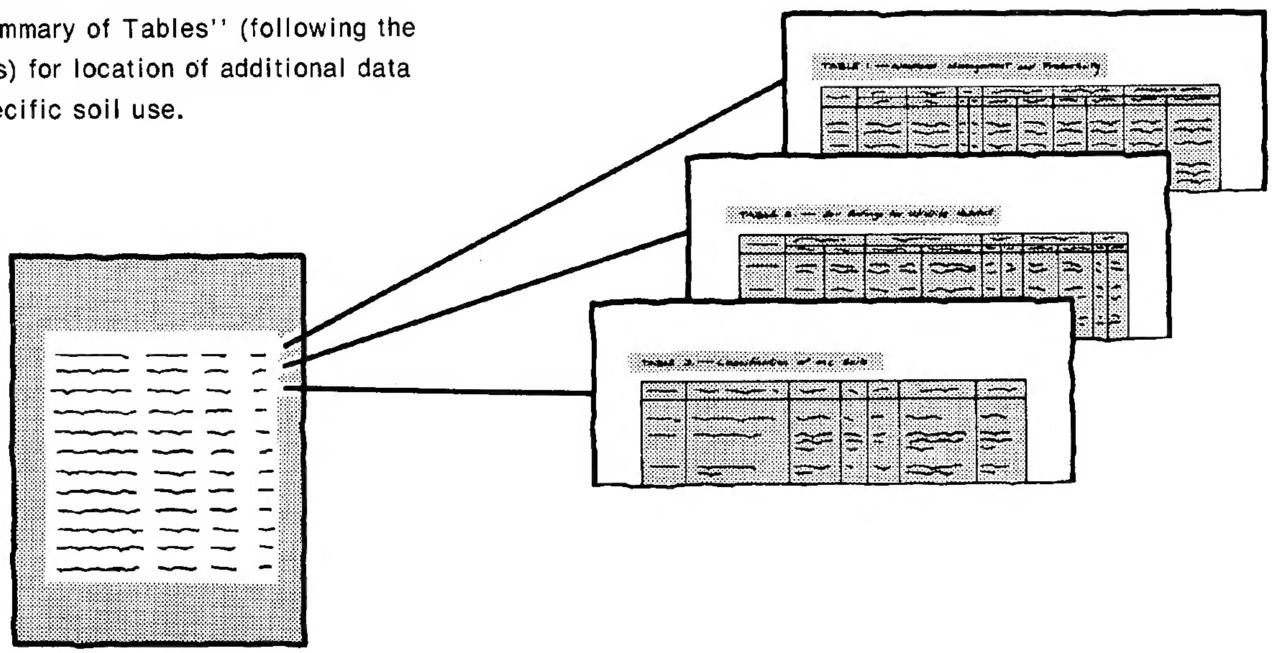


THIS SOIL SURVEY

5. Turn to "Index to Soil Map Units" which lists the name of each map unit and the page where that map unit is described.



6. See "Summary of Tables" (following the Contents) for location of additional data on a specific soil use.



7. Consult "Contents" for parts of the publication that will meet your specific needs. This survey contains useful information for farmers or ranchers, foresters or agronomists; for planners, community decision makers, engineers, developers, builders, or homebuyers; for conservationists, recreationists, teachers, or students; for specialists in wildlife management, waste disposal, or pollution control.

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other federal agencies, state agencies including the Agricultural Experiment Stations, and local agencies. The Soil Conservation Service has leadership for the federal part of the National Cooperative Soil Survey. In line with Department of Agriculture policies, benefits of this program are available to all, regardless of race, color, national origin, sex, religion, marital status, or age.

Major fieldwork for this soil survey was completed in 1980. Soil names and descriptions were approved in 1982. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1981. This survey was made cooperatively by the Soil Conservation Service and the Virginia Polytechnic Institute and State University and was financed in part by the Virginia Soil and Water Conservation Commission and the Middlesex County Board of Supervisors. The survey is part of the technical assistance furnished to the Tidewater Soil and Water Conservation District.

Soil maps in this survey may be copied without permission. Enlargement of these maps, however, could cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soils that could have been shown at a larger scale.

Cover: The fallow cropland is mostly on Emporia loam, 2 to 6 percent slopes.

Contents

Soil Series

Issued December 1985

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Summary of Tables

Foreword

This soil survey contains information that can be used in land-planning programs in Middlesex County. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations and hazards inherent in the soil, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

This soil survey is designed for many different users. Farmers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to insure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described. Information on specific uses is given for each soil. Help in using this publication and additional information are available at the local office of the Soil Conservation Service or the Cooperative Extension Service.

Manly S. Wilder

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State Conservationist
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Soil Survey of
Middlesex County, Virginia

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United States Department of Agriculture
Soil Conservation Service
In cooperation with
Virginia Polytechnic Institute and
State University

MIDDLESEX COUNTY is a coastal county in Virginia's northern Middle Peninsula and has a land area of about 132 square miles, or 84,400 acres. The county has a population of about 7,000 and is mostly rural; farming and forestry are the main land uses. However, because of the accessibility to the Rappahannock and Piankatank Rivers and the Chesapeake Bay, some development has taken place.

Settlement of what is now Middlesex County began around 1640. The county was formed officially in 1669 from part of Lancaster County, which is immediately north across the Rappahannock River.

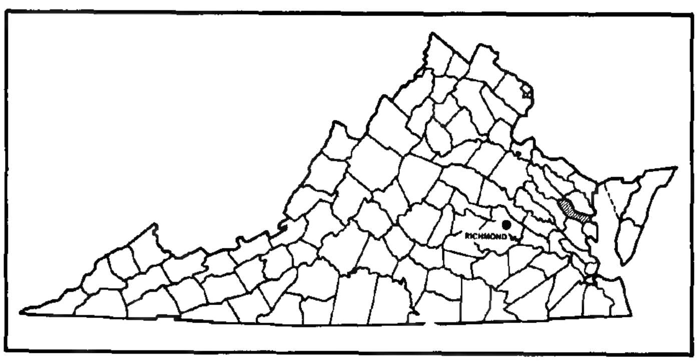

Figure 1.—Location of Middlesex County in Virginia.

The main automotive routes in the county are U.S. Highway 17 and Virginia Primary Highways 3 and 33. One public airport, Hummel Field, provides services for small private aircraft.

General Nature of the Survey Area

This section provides general information about some of the factors that affect the development and use of the soils in the county.

Physiography, Relief, and Drainage

Elevation in the county ranges from sea level along the shoreline to about 120 feet above sea level in the far northwestern section of the county. The county is entirely in the Coastal Plain and consists of three principal marine terraces.

The youngest terrace is mainly east of Deltaville. The elevation is mostly less than 20 feet above sea level, and the majority of the soils are poorly drained. The relief is mostly nearly level. The soils of this terrace make up about 6 percent of the county.

The second marine terrace is at an elevation of about 20 to 50 feet above sea level. The soils of this terrace generally are well drained or moderately well drained. The relief is mostly nearly level to strongly sloping on

uplands and steep or very steep on terrace breaks and in drainageways. This terrace makes up approximately 26 percent of Middlesex County.

The remaining 68 percent of the county is on a third marine terrace that is at an elevation of about 50 to 120 feet above sea level. The terrace break, or escarpment, at an elevation of 50 feet is evident throughout most of the county. This terrace is identified on the general soil map by two major map units. One unit consists of soils that are mostly well drained and permeable, while the other has soils that are mostly moderately well drained and have restricted permeability. The relief on this terrace is mostly gently sloping, but strongly sloping to very steep areas are around drainageways that commonly dissect the terrace.

Middlesex County is drained mainly by numerous tributaries that lead into the Rappahannock and Piankatank Rivers. These tributaries are usually affected by tidal action at their mouths where the water is brackish to saline. The tributaries that lead into the Dragon Run Swamp consist of freshwater, however. The youngest marine terrace has poorly expressed drainage patterns because of its low elevation and nearly level terrain. Consequently, much of that area is poorly drained.

Water Supply

No reservoir or other surface-impoundment water supplies are in Middlesex County. The ground water in the county is in three major aquifer systems: (1) the "water table aquifer," (2) the "upper artesian aquifer," (3) the "principal artesian aquifer."

The water table aquifer is the uppermost system and is referred to as the Yorktown Aquifer. It is mainly east of Saluda and is an important source for the Deltaville and Stingray Point areas, where the water in the other two lower aquifer systems is brackish and not potable. This unconsolidated aquifer is a reliable source of domestic ground water, but seasonal fluctuations and lack of sufficient storage make it impractical as a source for industrial or municipal supplies. The Yorktown Aquifer is at a depth of 50 to 140 feet and provides 5 to 30 gallons per minute from a 4-inch-diameter well.

The upper artesian aquifer is a reliable source of domestic water in all but the Deltaville and Stingray Point areas. The upper artesian aquifer is somewhat high in mineral content. It provides about 15 gallons per minute from a 4-inch-diameter well and is at a depth of about 250 feet.

The principal artesian aquifer is the deepest and best aquifer system in the county. It has a high-yield potential in the western two-thirds of the county. The principal artesian aquifer provides 50 to 375 gallons per minute from a 4-inch-diameter well and is at a depth of about 300 to 400 feet.

Geology

Middlesex County is in the embayed section of the Coastal Plain physiographic province. The geology consists of unconsolidated sediments that have eroded mostly from the west and, in places, have mixed with marine sediments. These unconsolidated sediments range in thickness from approximately 1,200 feet in the far northwestern section of the county to about 2,300 feet at the eastern tip.

The geologic formations in the county immediately below the land surface are referred to as the Columbia and Yorktown Formations.

The Columbia Formation is the younger and is in an area from around Deltaville east to the Chesapeake Bay. These deposits are of marine and nonmarine origin, are from Pliocene to Recent in age, and cover most of the Yorktown and older formations. The Columbia formation is as much as 122 feet thick. It consists mainly of oxidized clays, silts, sands, and some gravel. In most places the sediments of the Columbia Formation contrast sharply with any underlying marine formation.

The Yorktown Formation includes the St. Mary's Formation and is the major formation in the county. The Yorktown Formation is of Miocene age. It mostly contains silts, sands, and shell beds and very few clay beds. It mainly is gray, light gray, and bluish gray. This formation ranges from 60 to 100 feet in thickness.

Industry

Farming and fishing, including shell fishing, traditionally have been the economic base of the county. However, recreation has increased significantly in the past few years because of the easy access to the rivers and the Chesapeake Bay.

Forests cover about 63 percent of Middlesex County and provide a base for jobs in lumbering and wood-related manufacturing. Farms cover about 31 percent of the county. Grains, poultry, dairy products, and hogs are the principal commodities.

Climate

Prepared by the National Climatic Center, Asheville, North Carolina.

Table 1 gives data on temperature and precipitation for the survey area as recorded at Williamsburg, Virginia, in the period 1951 to 1976. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on length of the growing season.

In winter the average temperature is 41 degrees F, and the average daily minimum temperature is 30 degrees. The lowest temperature on record, which occurred at Williamsburg on January 22, 1970, is 1 degree. In summer the average temperature is 76 degrees, and the average daily maximum temperature is

87 degrees. The highest recorded temperature, which occurred at Williamsburg on June 26, 1952, is 104 degrees.

Growing degree days are shown in table 1. They are equivalent to "heat units." During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (40 degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

The total annual precipitation is 52 inches. Of this, 26 inches, or 50 percent, usually falls in April through September. The growing season for most crops falls within this period. In 2 years out of 10, the rainfall in April through September is less than 21 inches. The heaviest 1-day rainfall during the period of record was 9.95 inches at Williamsburg on September 1, 1975. Thunderstorms occur on about 40 days each year, and most occur in summer.

The average seasonal snowfall is 9 inches. The greatest snow depth at any one time during the period of record was 19 inches. On an average of 3 days, at least 1 inch of snow is on the ground. The number of such days varies greatly from year to year.

The average relative humidity in midafternoon is about 60 percent. Humidity is higher at night, and the average at dawn is about 80 percent. The sun shines 70 percent of the time possible in summer and 60 percent in winter. The prevailing wind is from the southwest. Average windspeed is highest, 12 miles per hour, in March.

How This Survey was Made

Soil scientists made this survey to learn what soils are in the survey area, where they are, and how they can be used. They observed the steepness, length, and shape of slopes; the size of streams and the general pattern of drainage; and the kinds of native plants or crops. They dug many holes to study soil profiles. A profile is the sequence of natural layers, or horizons, in a soil. It extends from the surface down into the parent material, which has been changed very little by leaching or by plant roots.

The soil scientists recorded the characteristics of the profiles they studied and compared those profiles with others in nearby counties and in more distant places. They classified and named the soils according to nationwide uniform procedures. They drew the boundaries of the soils on aerial photographs. These photographs show trees, buildings, fields, roads, and other details that help in drawing boundaries accurately. The soil maps at the back of this publication were prepared from aerial photographs.

The areas shown on a soil map are called map units. Most map units are made up of one kind of soil. Some are made up of two or more kinds. The map units in this survey area are described under "General Soil Map Units" and "Detailed Soil Map Units."

While a soil survey is in progress, samples of some soils are taken for laboratory measurements and for engineering tests. All soils are field tested to determine their characteristics. Interpretations of those characteristics may be modified during the survey. Data are assembled from other sources, such as test results, records, field experience, and state and local specialists. For example, data on crop yields under defined management are assembled from farm records and from field or plot experiments on the same kinds of soil.

But only part of a soil survey is done when the soils have been named, described, interpreted, and delineated on aerial photographs and when the laboratory data and other data have been assembled. The mass of detailed information then needs to be organized so that it can be used by farmers, woodland managers, engineers, planners, developers and builders, home buyers, and others.

General Soil Map Units

The general soil map at the back of this publication shows broad areas that have a distinctive pattern of soils, relief, and drainage. Each map unit on the general soil map is a unique natural landscape. Typically, a map unit consists of one or more major soils and some minor soils. It is named for the major soils. The soils making up one unit can occur in other units but in a different pattern.

The general soil map can be used to compare the suitability of large areas for general land uses. Areas of suitable soils can be identified on the map. Likewise, areas where the soils are not suitable can be identified.

Because of its small scale, the map is not suitable for planning the management of a farm or field or for selecting a site for a road or building or other structure. The soils in any one map unit differ from place to place in slope, depth, drainage, and other characteristics that affect management.

Soil Descriptions

1. Suffolk-Eunola-Remlik

Deep, well drained and moderately well drained, nearly level to very steep soils that have a dominantly loamy subsoil; at an elevation of mostly 20 to 50 feet above sea level

This unit makes up about 20 percent of the county. It is on broad ridges, side slopes, and some upland flats on the Yorktown Terrace. Slopes commonly range from 0 to 15 percent. Along larger drainageways and streams, the slope range increases to as much as 45 percent in places.

The Suffolk soils make up about 70 percent of this unit. They are well drained and have a surface layer generally of dark yellowish brown fine sandy loam. The subsoil mostly is brown fine sandy loam and sandy clay loam, and the substratum is brownish yellow loamy sand and pale brown fine sand. The Suffolk soils are on broad, nearly level ridges and very steep side slopes. Slopes range from 0 to 45 percent.

The Eunola soils make up about 11 percent of this unit. They are moderately well drained and have a surface layer generally of brown loam. The subsoil is yellowish brown loam in the upper part and mostly mottled, brown clay loam, sandy clay loam, and sandy loam in the lower part. The substratum is mottled, brown loamy sand and sand. The Eunola soils are mainly on broad flats and at the head of drainageways. Slopes range from 0 to 2 percent.

The Remlik soils make up about 8 percent of this unit. They are well drained and have a thick, grayish brown and yellowish brown surface layer of loamy sand. The subsoil is strong brown sandy loam and sandy clay loam, and the substratum is brownish yellow loamy fine sand. Slopes range mainly from 6 to 45 percent.

Soils of minor extent make up about 11 percent of this unit. They are: somewhat excessively drained Catpoint soils, well drained Rumford soils, moderately well drained Nansemond soils, poorly drained Myatt, Bibb, and Kinston soils, and very poorly drained Pocaty soils. The Catpoint, Rumford, and Nansemond soils are mostly on broad ridges. The Myatt soils are on broad flats and in slight depressions. The Bibb, Kinston, and Pocaty soils are on stream bottoms or adjacent to brackish water.

This unit is used mainly for cultivated crops or for residential development. Some areas, especially those along the Rappahannock and Piankatank Rivers, are being converted from farming to urban uses. The Eunola soils and other associated soils with a seasonal high water table generally respond well to artificial drainage.

2. Slagle-Ackwater-Craven

Deep, moderately well drained, nearly level or gently sloping soils that have a dominantly loamy or clayey subsoil; at an elevation mostly of 20 to 50 feet above sea level

This unit makes up about 6 percent of the county. It is on broad flats and side slopes of the Yorktown Terrace. Slopes commonly range from 0 to 6 percent.

The Slagle soils make up about 35 percent of this unit. They generally have a surface layer of grayish brown silt loam. The subsoil is pale brown silt loam in the upper part and mottled, brown and gray loam in the lower part. Slopes range mostly from 0 to 6 percent.

The Ackwater soils make up about 22 percent of this unit. They have a surface layer generally of yellowish brown silt loam. The subsoil is yellowish brown clay loam in the upper part; mottled, yellowish brown clay loam and clay and brownish yellow clay in the middle part; and mottled, gray clay in the lower part. The Ackwater soils are on broad upland terraces that have slopes of 0 to 2 percent.

The Craven soils make up about 18 percent of this unit. They have a surface layer commonly of brown silt loam. The subsoil mostly is yellowish brown silty clay loam and clay in the upper part; mottled, yellowish brown clay in the middle part; and mottled, gray sandy clay loam in the lower part. The substratum mostly is gray and brown sandy loam. Slopes range mostly from 0 to 6 percent.

Soils of minor extent make up about 25 percent of this unit. They are: well drained Emporia soils; moderately well drained Eunola and Nevarc soils; poorly drained Bethera, Bibb, Kinston, and Daleville soils; and very poorly drained Pocaty soils. The Eunola soils are on nearly level areas, and the Emporia and Nevarc soils are on steep side slopes. The Bethera and Daleville soils are on broad flats and at the head of drainageways. The Bibb, Kinston, and Pocaty soils are on stream bottoms or near areas of brackish water.

This unit is used mainly for cultivated crops and woodland.

3. Kempsville-Suffolk-Kinston

Deep, well drained and poorly drained, nearly level to very steep soils that have a dominantly loamy subsoil or substratum; at an elevation of mainly more than 50 feet above sea level

This unit makes up about 27 percent of the county. It is on broad ridges, gently sloping to very steep side slopes, and narrow stream bottoms. Slopes commonly range from 0 to 6 percent but are as much as 45 percent in places along larger drainageways and streams.

The Kempsville soils make up about 41 percent of this unit. They are well drained and have a surface layer of brown sandy loam. The subsoil mostly is strong brown sandy clay loam and sandy loam in the upper part and yellowish red sandy clay loam in the lower part. Kempsville soils are mostly on broad ridges that have slopes of 0 to 6 percent.

The Suffolk soils make up about 9 percent of this unit. They are well drained and have a surface layer of dark yellowish brown fine sandy loam. The subsoil mostly is brown fine sandy loam and sandy clay loam, and the substratum is brownish yellow loamy sand and pale brown fine sand. The Suffolk soils are mostly along large drainageways and streams. In most places they are intermingled with Remlik soils. Slopes range from 6 to 45 percent.

The Kinston soils make up about 5 percent of this unit. They are poorly drained and have a surface layer of brown loam. The substratum is dark grayish brown clay loam in the upper part and gray sandy clay loam and sandy loam in the lower part. The Kinston soils are intermingled with Bibb soils on stream bottoms. Slopes range from 0 to 2 percent.

Soils of minor extent make up about 45 percent of this unit. They are: well drained Emporia and Suffolk soils, moderately well drained Eunola and Slagle soils, and poorly drained Myatt and Bibb soils. The Emporia and Suffolk soils are on ridges and side slopes. The Eunola, Slagle, and Myatt soils are on slightly lower areas and in slight depressions. The Bibb soils are intermingled with Kinston soils on stream bottoms.

This unit is used mainly for woodland, but some large areas are used for cultivated crops. Many of the upland soils are well suited to farming and urban uses.

4. Emporia-Slagle-Nevarc

Deep, well drained and moderately well drained, nearly level to very steep soils that have a dominantly loamy or clayey subsoil; at an elevation of mainly more than 50 feet above sea level

This unit makes up about 41 percent of the county. It is on narrow ridges, side slopes, and upland flats. Slopes commonly range from 0 to 6 percent but are as much as 45 percent in areas along larger drainageways and streams.

The Emporia soils make up about 41 percent of this unit. They are well drained and mainly have a surface layer of dark grayish brown loam. The subsoil is yellowish brown loam and clay loam in the upper part and mottled, yellowish brown loam, clay loam, and sandy clay loam in the lower part. The substratum is mottled, yellowish red sandy clay loam. The Emporia soils are dominantly on broad ridges. Slopes range mainly from 0 to 6 percent, but the Emporia soils are intermingled with Nevarc soils on slopes of as much as 45 percent.

The Slagle soils make up about 23 percent of this unit. They are moderately well drained and mainly have a surface layer of grayish brown silt loam. The subsoil is pale brown silt loam in the upper part; mottled, brown loam in the middle part; and mottled, gray loam in the lower part. The soils are mostly on uplands with slopes of 0 to 6 percent.

The Nevarc soils make up about 8 percent of the unit. They are moderately well drained and commonly have a surface layer of grayish brown silt loam and pale brown loam. The subsoil mostly is yellowish brown clay loam in the upper part and mottled, strong brown clay in the lower part. The substratum is mottled, gray clay and mottled, brown sandy clay loam. The Nevarc soils are intermingled with Emporia soils on side slopes along large drainageways and streams. Slopes range from 6 to 45 percent.

Soils of minor extent make up about 28 percent of this unit. They are: well drained Kempsville and Suffolk soils and poorly drained Bethera, Bibb, Kinston, and Daleville soils. The Kempsville and Suffolk soils are intermingled on ridges. The Bethera and Daleville soils are on large flats and in slight depressions. The Bibb and Kinston soils are on stream bottoms.

This unit is used mainly for woodland, but some areas are farmed. Most of the soils do not respond well to tile

drainage because of moderately slow permeability in the subsoil. A seasonal high water table and permeability limit these soils for residential development.

5. Pocaty-Kinston-Bibb

Deep, very poorly drained and poorly drained, nearly level soils that are flooded by freshwater or brackish water and that have an organic or loamy substratum; at an elevation of mainly less than 20 feet above sea level

This unit makes up about 4 percent of the county. It is mostly along Dragon Run, at the mouth of the Piankatank River, and along numerous smaller stream bottoms. The areas are known locally as "freshwater swamps" and "low saltwater marshes".

The Pocaty soils make up about 39 percent of the unit. They are very poorly drained, organic soils that usually are flooded twice daily by brackish water. The Pocaty soils have a surface layer and subsurface layer of black muck.

The Kinston and Bibb soils are poorly drained and are on stream bottoms and flood plains that are flooded with freshwater. Together they make up about 57 percent of this unit. The Kinston soils commonly have a surface layer of brown loam and a substratum that is dark grayish brown clay loam in the upper part and gray sandy clay loam and sandy loam in the lower part. The Bibb soils have a surface layer of dark grayish brown sandy loam. The substratum is gray sandy loam and fine sandy loam in the upper part and gray loamy sand and sand in the lower part.

Soils of minor extent, mainly well drained Ochlockonee soils, make up about 4 percent of this unit. They are in intermittent drainageways.

This unit is in woodland or native grassy vegetation. The unit is used mainly for wildlife habitat and for limited timber production. The Bibb and Kinston soils support some commercial hardwoods and provide habitat for many wildlife species. The low saltwater marshes provide spawning grounds for many saltwater species of fish and for the blue crab.

6. Myatt-Eunola-Lumbee

Deep, poorly drained and moderately well drained, nearly level soils that have a dominantly loamy subsoil; at an elevation of mainly less than 20 feet above sea level

This unit makes up about 2 percent of the county. It is mostly on a broad, low flat called Stingray Point.

The Myatt soils make up about 37 percent of the unit. They are poorly drained and have a surface layer of dark grayish brown and light grayish brown loam. The subsoil mostly is mottled, gray clay loam, sandy clay loam, and fine sandy loam. The substratum is gray loamy fine sand. The Myatt soils are on flats.

The Eunola soils make up about 29 percent of the unit. They are moderately well drained and have a surface layer commonly of brown loam. The subsoil is yellowish brown loam in the upper part and is mostly mottled, brown clay loam, sandy clay loam, and sandy loam in the lower part. The substratum is mottled, brown loamy sand and sand. The Eunola soils are mainly on slightly higher areas adjacent to open water and drainageways.

The Lumbee soils make up about 20 percent of the unit. They are poorly drained and have a surface layer mainly of gray and light brownish gray silt loam. The subsoil mostly is mottled, grayish brown silt loam in the upper part and mottled, gray loam and sandy loam in the lower part. The substratum mostly is mottled, gray sand. The Lumbee soils are on flats that extend to the water's edge in many places.

Soils of minor extent make up about 14 percent of this unit. They are: moderately well drained Nansemond soils, moderately well drained somewhat poorly drained Pactolus soils, and very poorly drained Pocaty soils. The Nansemond and Pactolus soils are mostly on slightly higher areas adjacent to open water. The Pocaty soils are in small marshes.

This unit is used mainly for woodland and as a site for summer homes. A seasonal high water table is the main limitation for community development. Some areas have been drained and are farmed. Most areas are managed for loblolly pine and hardwoods, but when the soils are wet, access for heavy timber equipment is limited.

Detailed Soil Map Units

The map units on the detailed soil maps at the back of this survey represent the soils in the survey area. The map unit descriptions in this section, along with the soil maps, can be used to determine the suitability and potential of a soil for specific uses. They also can be used to plan the management needed for those uses. More information on each map unit, or soil, is given under "Use and Management of the Soils."

Each map unit on the detailed soil maps represents an area on the landscape and consists of one or more soils for which the unit is named.

A symbol identifying the soil precedes the map unit name in the soil descriptions. Each description includes general facts about the soil and gives the principal hazards and limitations to be considered in planning for specific uses.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer or of the underlying material, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer or of the underlying material. They also can differ in slope, salinity, wetness, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Emporia loam, 0 to 2 percent slopes, is one of two phases in the Emporia series.

Some map units are made up of two or more major soils. These map units are called soil complexes or undifferentiated groups.

A *soil complex* consists of two or more soils in such an intricate pattern or in such small areas that they cannot be shown separately on the soil maps. The pattern and proportion of the soils are somewhat similar in all areas. Kinston-Bibb complex is an example.

An *undifferentiated group* is made up of two or more soils that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils in a mapped area are not uniform. An area can be made up of only one of the major soils, or it can be made up of all of them. Bethera and Daleville soils is an undifferentiated group in this survey area.

Most map units include small scattered areas of soils other than those for which the map unit is named. Some of these included soils have properties that differ substantially from those of the major soil or soils. Such differences could significantly affect use and management of the soils in the map unit. The included soils are identified in each map unit description. Some small areas of strongly contrasting soils are identified by a special symbol on the soil maps.

Table 4 gives the acreage and proportionate extent of each map unit. Other tables (see "Summary of Tables") give properties of the soils and the limitations, capabilities, and potentials for many uses. The Glossary defines many of the terms used in describing the soils.

Soil Descriptions

1—Ackwater silt loam. This soil is deep, nearly level, and moderately well drained. It is mostly on terraces at an elevation of less than 50 feet above sea level. It is on points bounded by drainageways and is at the heads of drainageways. The areas are mostly triangular, oval, or irregularly shaped, depending upon the course of the drainageways. The areas range from about 5 to 40 acres. Slopes range from 0 to 2 percent.

Typically, the surface layer of this soil is yellowish brown silt loam about 6 inches thick. The subsoil extends to a depth of at least 60 inches. It is yellowish brown clay loam to a depth of 15 inches. Between depths of 15 and 34 inches, it is yellowish brown clay loam and clay with red and gray mottles. Below a depth of 34 inches, it is mottled, brownish yellow and light gray clay.

Included with this soil in mapping are small areas of well drained Emporia soils, moderately well drained Slagle soils, and poorly drained Bethera and Daleville soils. The Emporia soils are on slightly higher areas of the unit. The Slagle soils are on slightly higher areas away from the drainageways. The Bethera and Daleville soils are near the head of drainageways. Included soils make up about 15 percent of this unit.

The permeability of this Ackwater soil is slow, and the available water capacity is moderate. Surface runoff is slow. The erosion hazard is slight. The subsoil has a high shrink-swell potential. The root zone commonly extends to a depth of 60 inches or more. The soil is low in organic matter content and natural fertility. It ranges

mainly from extremely acid through strongly acid throughout, but the reaction of the surface layer varies because of local liming practices. A seasonal high water table is perched at a depth of 1-1/2 to 3 feet during winter and early spring.

Most areas of this soil are in woodland. A few areas are cultivated or used for pasture.

This soil is moderately well suited to cultivated crops. After heavy rains, a crust forms on the surface and the surface layer becomes compacted. The need to increase organic matter content, the need for lime and fertilizer to offset the acidity and low natural fertility, and the need for adequate drainage are major management concerns. The main management practices in cultivated areas are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; using cover crops and grasses and legumes in the copping system; and using crop residue on or in the soil. All of these practices help to reduce runoff and control erosion, maintain organic matter content and tilth, reduce crusting, and increase water infiltration in the soil.

This soil is moderately well suited to pasture and hay. Establishing and maintaining a mixture of grasses and legumes, using proper stocking rates and rotational and deferred grazing, and using lime and fertilizer help to increase the carrying capacity of pastures. Overgrazing and grazing when the soil is wet compact the surface layer and damage the stands of grasses and legumes.

The potential productivity for trees on this soil is moderately high, especially for loblolly pine, southern red oak, white oak, and sweetgum. Seeds and seedlings survive and grow well if competing vegetation is controlled. The soil is soft when wet, thus limiting the use of heavy timber equipment.

The seasonal high water table and the high shrink-swell potential and slow permeability of the subsoil are the main limitations of the soil for community development. They limit the use of the soil as a building site, as a site for sanitary landfills or septic tank absorption fields, and for some types of recreation. The soil has low strength as a subgrade material for local roads and streets.

The capability subclass is IIw.

2B—Bama loam, 2 to 6 percent slopes. This soil is deep, gently sloping, and well drained. It is on uplands mostly at an elevation of more than 50 feet above sea level. The areas are dissected by drainageways and mainly are long and narrow, but some are irregularly shaped. The areas range from about 5 to 40 acres. Slopes are about 20 to 800 feet long.

Typically, the surface layer of this soil is dark brown loam about 4 inches thick. The subsoil extends to a depth of at least 60 inches. It mostly is brown and yellowish red loam and red clay loam with pale brown mottles.

Included with this soil in mapping are small areas of well drained Kempsville and Emporia soils. The Kempsville soils are on slightly higher areas throughout the unit. The Emporia soils are on slightly lower areas and have gray mottles in the lower part of the subsoil. Included soils make up about 15 percent of this unit.

The permeability of this Bama soil is moderate, and the available water capacity is moderate. Surface runoff is medium. The erosion hazard is moderate. The subsoil has a low shrink-swell potential. The root zone extends to a depth of 60 inches or more. The soil is low in organic matter content and natural fertility. It commonly is very strongly acid or strongly acid throughout, but the reaction of the surface layer varies because of local liming practices.

Most areas of this soil are in woodland. A few areas are farmed.

This soil is well suited to cultivated crops. Crops respond well to lime and fertilizer. Conservation tillage, using cover crops and grasses and legumes in the cropping system, and using crop residue in or on the soil help to control runoff and erosion, maintain organic matter content and tilth, reduce crusting, and increase water infiltration.

This soil is well suited to pasture and hay. Establishing and maintaining a mixture of grasses and legumes, using proper stocking rates, rotational and deferred grazing, and using lime and fertilizer help to increase the carrying capacity of pastures. Overgrazing and grazing when the soil is wet compact the surface layer, damage the stands of grasses and legumes, and increase runoff and erosion.

The potential productivity for trees on this soil is high, especially for loblolly pine, sweetgum, and yellow poplar. The wooded areas are managed for pine and hardwoods. Seeds and seedlings survive and grow well if competing vegetation is controlled.

Slope is the main limitation of this soil for community development, especially for use of the soil as a site for small commercial buildings.

The capability subclass is IIe.

3—Bethera and Daleville soils. This unit consists of deep, nearly level, poorly drained soils mostly on flats and in slight depressions and at the heads of drainageways. These soils are mostly at an elevation of 20 to 50 feet above sea level, but some areas are at an elevation of more than 50 feet. The areas mostly are irregularly shaped. They range from about 5 to 100 acres. Slopes range from 0 to 2 percent. Some areas consist mostly of Bethera soils, some mostly of Daleville soils, and some of both. The Bethera and Daleville soils were mapped together because they have no major differences in use and management. The total acreage of the unit is about 40 percent Bethera soils, 35 percent Daleville soils, and 25 percent other soils.

Typically, the surface layer of the Bethera soils is dark grayish brown silt loam about 6 inches thick. The subsoil mostly is mottled, gray clay to a depth of at least 60 inches.

Typically, the surface layer of the Daleville soils is grayish brown loam about 9 inches thick. The subsoil mostly is mottled, gray clay loam to a depth of at least 60 inches.

Included with these soils in mapping are small areas of moderately well drained Ackwater, Craven, Eunola, and Slagle soils and poorly drained Myatt soils. The Ackwater, Craven, Eunola, and Myatt soils mainly are adjacent to drainageways. The Slagle soils mainly are on slightly higher convex areas adjacent to higher terraces. Also included are small areas of poorly drained soils with marine shells at a depth of more than 45 inches.

The permeability of these Bethera and Daleville soils is slow, and the available water capacity is moderate. Surface runoff is slow. The erosion hazard is slight. The subsoil of both soils has a moderate shrink-swell potential. The root zone of both extends to a depth of 60 inches or more. The soils are low in organic matter content and natural fertility. The Bethera soils commonly are extremely acid through strongly acid throughout and the Daleville soils very strongly acid or strongly acid; however, the reaction of the surface layer of both soils varies in areas that have been limed. Both soils have a seasonal high water table at a depth of 1/2 foot to 1 foot during winter and early spring.

Most areas of these soils are in woodland. The soils are generally not used for farming or urban development, but a small acreage is farmed.

Drained areas of these soils are moderately well suited to cultivated crops; undrained areas are poorly suited. Drainage generally does not completely alleviate wetness or protect crops from damage, however, because water does not readily percolate through the subsoil, especially the clayey subsoil of the Bethera soils. In some depressional areas outlets for drainage are difficult to establish. Crops respond well to lime and fertilizer, but the soils are wet and cold in spring and wetness often interferes with tillage. Conservation tillage, using cover crops and grasses and legumes in the cropping system, and using crop residue help to maintain organic matter content and tilth, reduce crusting, and increase water infiltration.

Drained areas of these soils are moderately well suited to pasture and hay. Establishing and maintaining a mixture of grasses and legumes, using proper stocking rates, rotational and deferred grazing, and using lime and fertilizer help to increase the carrying capacity of pastures. Overgrazing and grazing when the soil is wet cause compaction of the surface layer and damage the stands of grasses and legumes. The seasonal high water table during winter and spring also damages the stands of grasses and legumes.

The potential productivity for trees is high on these soils, especially for loblolly pine, sweet gum, water oak, and willow oak. Wetness limits the survival of seeds and seedlings. Drainage helps to increase productivity and seedling survival. The soil is soft when wet, thus limiting the use of heavy timber equipment.

The seasonal high water table and slow permeability are the main limitations of these soils for community development. Both limit the use of these soils as a building site, as a site for sanitary landfills or septic tank absorption fields, and for most types of recreation.

The capability subclass is IVw.

4—Catpoint loamy sand. This soil is deep, nearly level to gently sloping, and somewhat excessively well drained. It is on low-lying terraces along the Piankatank and Dragon Run Rivers. The areas commonly are long and narrow and are parallel to the rivers and drainageways. The areas range from about 5 to 20 acres. Slopes range from 0 to 4 percent.

Typically, the surface layer of this soil is dark brown loamy sand about 11 inches thick. The subsoil is 46 inches thick. It mostly is yellowish brown loamy sand and brownish yellow loamy sand and sand and has thin bands of strong brown sandy loam at a depth of 29 to 57 inches. The substratum is mottled, light yellowish brown sand.

Included with this soil in mapping are small areas of well drained Kenansville and Rumford soils and moderately well drained Nansemond and Pactolus soils. The Kenansville and Rumford soils are intermingled with the Catpoint soils. The Nansemond and Pactolus soils are near small drainageways and at the base of terrace breaks. Included soils make up about 15 percent of this unit.

The permeability of this Catpoint soil is rapid, and the available water capacity is low. Surface runoff is slow. The erosion hazard from water is slight. The wind erosion hazard is moderate. The substratum has a low shrink-swell potential. The root zone extends to a depth of 60 inches or more. The soil is low in organic matter content and natural fertility. It ranges from very strongly acid through slightly acid, but reaction of the surface layer varies in areas that have been limed. A seasonal high water table is at a depth of 4 to 6 feet during winter and spring.

Most areas of this soil are in woodland. A few areas are in residential developments.

This soil is moderately well suited to cultivated crops. The soil is droughty during the growing season, and crop response to lime and fertilizer is limited by the low available water capacity. The wind erosion hazard is a major management concern, especially during the early part of the growing season. Blowing soil often damages or covers small plants. The main management practices in cultivated areas are: using a conservation tillage system that includes no-till farming, strip tillage, and

stubble mulching; using cover crops and grasses and legumes in the cropping system; and using crop residue on or in the soil. All of these practices help to increase organic matter content and maintain tilth, reduce erosion and crop damage, and improve the moisture-holding capacity of the soil.

This soil is moderately well suited to pasture and hay. Establishing and maintaining a mixture of grasses and legumes, using proper stocking rates, rotational and deferred grazing, and using lime and fertilizer help to increase the carrying capacity of pastures. Overgrazing cuts the surface layer and damages the stands of grasses and legumes, thereby increasing the erosion hazard.

The potential productivity for trees on this soil is moderately high, especially for loblolly pine. The survival of seeds and seedlings is limited by the low available water capacity during the growing season.

The rapid permeability of the soil and the seasonal high water table are the main limitations for community development. Both cause a hazard of ground-water pollution in areas used for sewage lagoons, septic tank absorption fields, and sanitary landfills.

The capability subclass is IIIs.

5A—Craven silt loam, 0 to 2 percent slopes. This soil is deep, nearly level, and moderately well drained. It is mostly on ridges and side slopes at an elevation of 20 to 50 feet above sea level and near the head of drainageways at an elevation of more than 50 feet above sea level. The areas of this soil mostly are long and narrow, but some areas are irregularly oval. The areas range from about 5 to 40 acres.

Typically, the surface layer of this soil is dark grayish brown silt loam about 2 inches thick. The subsoil is 43 inches thick. It mostly is yellowish brown silty clay loam and clay in the upper 14 inches; mottled, yellowish brown clay in the next 12 inches; and mottled gray, brown, and yellow sandy clay loam in the lower 17 inches. The substratum mostly is mottled gray, brown, and yellow sandy loam to a depth of at least 66 inches.

Included with this soil in mapping are small areas of moderately well drained Slagle soils and poorly drained Bethera and Daleville soils. The Slagle soils are intermingled throughout the unit on slightly higher areas. The Bethera and Daleville soils are on slightly lower areas and in depressions. Included soils make up about 15 percent of this unit.

The permeability of this Craven soil is slow, and available water capacity is moderate. Surface runoff is slow. The erosion hazard is slight. The subsoil has a moderate shrink-swell potential. The root zone extends to a depth of 60 inches or more. The soil is low in organic matter content and natural fertility. It commonly is extremely acid through strongly acid, but reaction in the surface layer varies in areas that have been limed. A seasonal high water table is at a depth of 2 to 3 feet in winter and early in spring.

The use of the acreage of this soil is about equally divided between woodland and cropland.

This soil is well suited to cultivated crops. Crops respond well to lime and fertilizer; however, wetness in spring often delays tillage, and crusting of the surface layer is a management concern, especially after heavy rainfall. Conservation tillage, using cover crops and grasses and legumes in the cropping system, and using crop residue help to maintain organic matter content, improve tilth, control erosion, and reduce crusting. Diversions also help to reduce erosion in some areas.

The soil is well suited to pasture and hay. Establishing and maintaining a mixture of grasses and legumes, using proper stocking rates, rotational and deferred grazing, and using lime and fertilizer help to increase the carrying capacity of pastures on this soil. Grazing during wet periods compacts the surface layer of the soil, damages the grasses and legumes, and increases erosion.

The potential productivity of this soil for trees, especially loblolly pine and Virginia pine, is moderately high. Seedlings grow well if competing vegetation is controlled. The soil is soft when wet, limiting the use of timber equipment.

The seasonal high water table, slow permeability, moderate shrink-swell potential, clayey texture, and low strength of the soil are the main limitations for community development. The slow permeability and seasonal high water table limit use of the soil as a site for sanitary landfills and septic tank absorption fields. The water table, low strength, and moderate shrink-swell potential limit use as a building site. The low strength of the clayey subsoil restricts vehicular traffic when the soil is wet.

The capability subclass is IIw.

5B—Craven silt loam, 2 to 6 percent slopes. This soil is deep, gently sloping, and moderately well drained. It is mostly on ridges and side slopes at an elevation of 20 to 50 feet above sea level and near the head of drainageways at an elevation of more than 50 feet above sea level. Slopes are smooth, commonly convex, and 150 to 800 feet long. The areas of this soil mostly are long and narrow, but some areas are oval. The areas range from about 5 to 40 acres.

Typically, the surface layer of this soil is dark grayish brown silt loam about 2 inches thick. The subsoil is 43 inches thick. It mostly is yellowish brown silty clay loam and clay in the upper 14 inches; mottled, yellowish brown clay in the next 12 inches; and mottled gray, brown, and yellow sandy clay loam in the lower 17 inches. The substratum mostly is mottled gray, brown, and yellow sandy loam to a depth of at least 66 inches.

Included with this soil in mapping are small areas of moderately well drained Slagle soils and poorly drained Bethera and Daleville soils. The Slagle soils are

intermingled throughout the unit on slightly higher areas. The Bethera and Daleville soils are on slightly lower areas and in depressions. Included soils make up about 15 percent of this unit.

The permeability of this Craven soil is slow, and available water capacity is moderate. Surface runoff is medium. The erosion hazard is moderate. The subsoil has a moderate shrink-swell potential. The root zone extends to a depth of 60 inches or more. The soil is low in organic matter content and natural fertility. It commonly is extremely acid through strongly acid, but reaction in the surface layer varies in areas that have been limed. A seasonal high water table is at a depth of 2 to 3 feet in winter and early in spring.

The use of the acreage of this soil is about equally divided between woodland and cropland.

This soil is well suited to cultivated crops. Crops respond well to lime and fertilizer; however, wetness in spring often delays tillage, and crusting of the surface layer is common after heavy rainfall. The erosion hazard is a major management concern. Conservation tillage, using cover crops and grasses and legumes in the cropping system, and using crop residue help to maintain organic matter content, improve tilth, control erosion, and reduce crusting. Grassed waterways and diversions also help to reduce erosion in some areas.

This soil is well suited to pasture and hay. Establishing and maintaining a mixture of grasses and legumes, using proper stocking rates, rotational and deferred grazing, and using lime and fertilizer help to increase the carrying capacity of pastures on this soil. Grazing during wet periods compacts the surface layer of the soil, damages the grasses and legumes, and increases erosion.

The potential productivity of this soil for trees, especially loblolly pine and Virginia pine, is moderately high. Seedlings grow well if competing vegetation is controlled. The soil is soft when wet, limiting the use of timber equipment.

The seasonal high water table, slow permeability, moderate shrink-swell potential, clayey texture, and low strength of the soil are the main limitations for community development. The slow permeability and seasonal high water table limit use of the soil as a site for sanitary landfills and septic tank absorption fields. The water table, low strength, and moderate shrink-swell potential limit use as a building site. The low strength of the clayey subsoil restricts vehicular traffic when the soil is wet.

The capability subclass is IIe.

6A—Emporia loam, 0 to 2 percent slopes. This soil is deep, nearly level, and well drained. It is mostly on low and intermediate terraces along the Rappahannock and Piankatank Rivers and on uplands at higher elevations. The areas of this soil are rectangular or oval. They range from about 5 to 40 acres.

Typically, the surface layer of this soil is dark grayish brown loam about 8 inches thick. The subsurface layer is brown loam 6 inches thick. The subsoil is 45 inches thick. It is yellowish brown loam and clay loam in the upper part and mottled yellowish brown loam, clay loam, and sandy clay loam in the lower part. The substratum is mottled, yellowish red sandy clay loam to a depth of at least 66 inches.

Included with this soil in mapping are small areas of well drained Suffolk soils and moderately well drained Eunola and Slagle soils. The Suffolk soils are on slightly higher areas throughout the unit. The Eunola and Slagle soils are in slightly lower areas and depressions throughout the unit. Included soils make up about 15 percent of this unit.

The permeability of this Emporia soil is moderate in the upper part of the subsoil and moderately slow in the lower part. The available water capacity is moderate. Surface runoff is slow. The erosion hazard is slight. The subsoil has a moderate shrink-swell potential. The root zone extends to a depth of 60 inches or more but is somewhat restricted by a firm layer at a depth of about 39 inches. The soil is low in organic matter content and natural fertility. It commonly is very strongly acid or strongly acid throughout, but reaction of the surface layer varies because of local liming practices. A seasonal high water table is perched at a depth of 3 to 4-1/2 feet during winter and spring.

Most areas of this soil are used for cultivated crops. A few areas are in woodland, and a few are in residential development.

This soil is well suited to cultivated crops. Crops respond well to lime and fertilizer. Conservation tillage, using cover crops and grasses and legumes in the cropping system, and using crop residue help to maintain organic matter content and tilth, control erosion, reduce crusting, and increase water infiltration.

This soil is well suited to pasture and hay. Establishing and maintaining a mixture of grasses and legumes, using proper stocking rates, rotational and deferred grazing, and using lime and fertilizer help to increase the carrying capacity of pastures. Overgrazing causes compaction of the surface layer and increases runoff and erosion.

The potential productivity for trees on this soil is moderately high, especially for loblolly pine, sweetgum, and yellow-poplar. Seeds and seedlings grow well if competing vegetation is controlled. When the soil is wet, it is soft and will not support heavy timber equipment.

Low strength, the moderate shrink-swell potential, the seasonal high water table, and the moderately slow permeability of the subsoil are the main limitations for community development. The low strength and shrink-swell potential limit use of the soil as a building site, and the high water table limits excavation. The permeability and the water table limit use of the soil for septic tank absorption fields.

The capability class is I.

6B—Emporia loam, 2 to 6 percent slopes. This soil is deep, gently sloping, and well drained. It is mostly on uplands at an elevation of more than 50 feet above sea level. Slopes are smooth, commonly convex, and range from 150 to 600 feet in length. The areas of this soil commonly are long and narrow or oval. They range from about 5 to 80 acres.

Typically, the surface layer of this soil is dark grayish brown loam about 8 inches thick. The subsurface layer is brown loam 6 inches thick. The subsoil is 45 inches thick. It is yellowish brown loam and clay loam in the upper part and mottled, yellowish brown loam, clay loam, and sandy clay loam in the lower part. The substratum is mottled, yellowish red sandy clay loam to a depth of at least 66 inches.

Included with this soil in mapping are small areas of well drained Bama and Kempsville soils and moderately well drained Slagle soils. The Bama and Kempsville soils are in slightly higher areas throughout the unit. The Slagle soils are in slightly lower areas and adjacent to drainageways. Included soils make up about 25 percent of this unit.

The permeability of this Emporia soil is moderate in the upper part of the subsoil and moderately slow in the lower part. The available water capacity is moderate. Surface runoff is medium. The erosion hazard is moderate. The subsoil has a moderate shrink-swell potential. The root zone extends to a depth of 60 inches or more but is somewhat restricted by a firm layer at a depth of about 39 inches. The soil is low in organic matter content and natural fertility. It commonly is very strongly acid or strongly acid throughout, but reaction of the surface layer varies because of local liming practices. A seasonal high water table is perched at a depth of 3 to 4½ feet during winter and spring.

Most areas of this soil are in woodland. Some areas are farmed, and some are in residential developments.

This soil is well suited to cultivated crops. Crops respond well to lime and fertilizer. The erosion hazard is a major management concern. Conservation tillage, using cover crops and grasses and legumes in the cropping system, and using crop residue help to maintain organic matter content and tilth, control erosion, reduce crusting, and increase water infiltration. Grassed waterways and diversions also help to control surface runoff and reduce erosion.

This soil is well suited to pasture and hay. Establishing and maintaining a mixture of grasses and legumes, using proper stocking rates, rotational and deferred grazing, and using lime and fertilizer help to increase the carrying capacity of pastures. Overgrazing causes compaction of the surface layer and increases runoff and erosion.

The potential productivity for trees on this soil is moderately high, especially for loblolly pine, sweetgum, and yellow-poplar. Seeds and seedlings grow well if competing vegetation is controlled. When the soil is wet, it is soft and will not support heavy timber equipment.

Low strength, the moderate shrink-swell potential, the seasonal high water table, and the moderately slow permeability of the subsoil are the main limitations for community development. The low strength and shrink-swell potential limit use of the soil as a building site, and the high water table limits excavation. The permeability and the water table limit use of the soil for septic tank absorption fields.

The capability subclass is IIe.

7D—Emporia-Nevarc complex, 6 to 15 percent slopes. This unit consists of deep, strongly sloping to moderately steep soils. The soils are on side slopes of drainageways and terrace breaks throughout the survey area and are mostly at an elevation of more than 50 feet above sea level. The areas mostly are long and narrow and are parallel to the drainageways and terrace breaks. Slopes commonly are short and steep and range from about 75 to 200 feet in length. The areas range from about 2 to 30 acres. They are about 50 percent well drained Emporia soils, 30 percent moderately well drained Nevarc soils, and 20 percent other soils. The Emporia and Nevarc soils are so intermingled that it was not practical to map them separately.

Typically, the surface layer of the Emporia soils is dark grayish brown loam about 8 inches thick. The subsurface layer is brown loam 3 inches thick. The subsoil is 48 inches thick. It is yellowish brown loam and clay loam in the upper part and mottled, yellowish brown loam, clay loam, and sandy clay loam in the lower part. The substratum is mottled, yellowish red sandy clay loam to a depth of at least 66 inches.

Typically, the surface layer of the Nevarc soils is grayish brown silt loam about 3 inches thick. The subsurface layer is pale brown loam 11 inches thick. The subsoil is 28 inches thick. It mostly is yellowish brown clay loam in the upper part and mottled, strong brown clay in the lower part. The substratum mostly is mottled, light gray clay and mottled, strong brown sandy clay loam to a depth of at least 64 inches.

Included with these soils in mapping are small areas of well drained Bama and Kempsville soils and moderately well drained Ackwater and Slagle soils. The Bama and Kempsville soils are on slightly higher areas along the perimeter of the unit. The Ackwater and Slagle soils mainly are on the upper part of the side slope.

The permeability of these Emporia soils is moderate in the upper part of the subsoil and moderately slow in the lower part. Permeability is slow in the subsoil of the Nevarc soils. The available water capacity is moderate for both soils. Surface runoff is rapid, and the erosion hazard is severe. The subsoil of both soils has a moderate shrink-swell potential. The root zone extends to a depth of 60 inches or more in both soils but is somewhat restricted in the Emporia soils by a firm layer at a depth of about 39 inches. Both soils are low in organic matter content and natural fertility. The Emporia

Figure 2.—Strongly sloping Nevarc soils in an area of Emporia-Nevarc complex, 6 to 15 percent slopes.

soils commonly are very strongly acid or strongly acid, and the Nevarc soils are extremely acid through moderately acid. The Emporia soils have a seasonal high water table that is perched at a depth of 3 to 4½ feet, mostly during winter and spring. The Nevarc soils have a seasonal high water table perched at a depth of 1½ to 3 feet.

The steepness and complexity of slope limit the use of farm equipment and make these soils generally unsuitable for farming (fig. 2). Some small areas are farmed, especially on some of the strongly sloping soils. The severe erosion hazard in these areas is a major management concern. Conservation tillage, using cover crops and grasses and legumes in the cropping system, and using crop residue help to maintain organic matter content and tilth, control erosion, reduce crusting, and increase water infiltration. Grassed waterways and diversions also help to control surface runoff and reduce erosion.

The potential productivity for trees on these soils is moderately high. Most of the acreage is in woodland and is managed for loblolly pine, sweetgum, and oak. Placing logging roads and skid trails on the contour of the landscape helps to reduce the concentration of runoff and thereby control erosion.

Slope, the seasonal high water table, the permeability, and the shrink-swell potential are the main limitations of these soils for community development, especially for use as sites for recreation, buildings, and septic tank absorption fields.

The capability subclass is IVe.

7F—Emporia-Nevarc complex, 15 to 45 percent slopes. This unit consists of deep, steep to very steep soils. The soils are on side slopes of drainageways and terrace breaks throughout the survey area and are mostly at an elevation of more than 50 feet above sea level. The areas mostly are long and narrow and parallel to the drainageways and terrace breaks. Slopes

commonly are short and steep and range from about 50 to 150 feet in length. The areas range from about 2 to 30 acres. They are about 50 percent well drained Emporia soils, 30 percent moderately well drained Nevarc soils, and 20 percent other soils. The Emporia and Nevarc soils are so intermingled that it was not practical to map them separately.

Typically, the surface layer of the Emporia soils is dark grayish brown loam about 8 inches thick. The subsurface layer is brown loam 3 inches thick. The subsoil is 48 inches thick. It is yellowish brown loam and clay loam in the upper part and mottled, yellowish brown loam, clay loam, and sandy clay loam in the lower part. The substratum is mottled, yellowish red sandy clay loam to a depth of at least 66 inches.

Typically, the surface layer of the Nevarc soils is grayish brown silt loam about 3 inches thick. The subsurface layer is pale brown loam 11 inches thick. The subsoil is 28 inches thick. It mostly is yellowish brown clay loam in the upper part and mottled, strong brown clay in the lower part. The substratum mostly is mottled, light gray clay and mottled, strong brown sandy clay loam to a depth of at least 64 inches.

Included with these soils in mapping are small areas of well drained Bama and Kempsville soils and moderately well drained Ackwater and Slagle soils. The Bama and Kempsville soils are on slightly higher areas along the perimeter of the unit. The Ackwater and Slagle soils mainly are on the upper part of the side slope.

The permeability of these Emporia soils is moderate in the upper part of the subsoil and moderately slow in the lower part. Permeability is slow in the subsoil of the Nevarc soils. The available water capacity is moderate for both soils. Surface runoff is rapid to very rapid, and the erosion hazard is severe. The subsoil of both soils has a moderate shrink-swell potential. The root zone extends to a depth of 60 inches or more in both soils but is somewhat restricted in the Emporia soils by a firm layer at a depth of about 39 inches. Both soils are low in organic matter content and natural fertility. The Emporia soils commonly are very strongly acid or strongly acid, and the Nevarc soils are extremely acid through moderately acid. The Emporia soils have a seasonal high water table that is perched at a depth of 3 to 4½ feet, mostly during winter and spring. The Nevarc soils have a seasonal high water table perched at a depth of 1½ to 3 feet.

Slope limits the use of farm equipment and makes these soils generally unsuitable for farming. The potential for trees on these soils is moderately high. Most of the acreage is in woodland and is managed for loblolly pine, sweetgum, and oaks; however, slope also limits the operation of heavy timber equipment. Placing logging roads and skid trails on the contour of the landscape helps to reduce the concentration of runoff and thereby control erosion.

Slope is the main limitation of these soils for community development, especially for use as sites for recreation, buildings, and septic tank absorption fields.

The capability subclass is VIIe.

8—Eunola loam. This soil is deep, nearly level to gently sloping, and moderately well drained. It is mostly on lower terrace uplands at an elevation of about 20 to 50 feet above sea level. The areas of this soil mostly are oval. They range from about 2 to 40 acres. Slopes range from 0 to 4 percent.

Typically, the surface layer of this soil is brown loam about 9 inches thick. The subsoil is 32 inches thick. The upper part is yellowish brown loam and clay loam. The lower part is mottled, light olive brown sandy clay loam and sandy loam. The substratum mostly is mottled, brown loamy sand and sand to a depth of at least 60 inches.

Included with this soil in mapping are small areas of poorly drained Myatt soils, somewhat poorly drained to moderately well drained Pactolus soils, moderately well drained Nansemond soils, and well drained Kenansville soils. The Myatt soils are on lower areas adjacent to drainageways. The Pactolus and Nansemond soils are in slight depressions throughout the unit and at the base of slopes. The Kenansville soils are on slightly higher parts of the unit. Included soils make up about 20 percent of this unit.

The permeability of this Eunola soil is moderate in the subsoil and rapid in the substratum. The available water capacity is moderate. Surface runoff is slow. The erosion hazard is slight. The subsoil has a low shrink-swell potential. The root zone extends to a depth of 60 inches or more. The soil is low in organic matter content and natural fertility. It mainly is very strongly acid or strongly acid throughout, but reaction of the surface layer varies because of local liming practices. A seasonal high water table is at a depth of 1½ to 2½ feet during winter and spring.

Most areas of this soil are farmed or in pasture (fig. 3). The remaining acreage is in mixed hardwoods and pines.

This soil is well suited to cultivated crops. Crops respond well to lime and fertilizer. The soil is wet and cold in the spring in some areas, and wetness often delays tillage. Drainage helps to alleviate wetness and protects crop from damage. Conservation tillage, using cover crops and grasses and legumes in the cropping sytem, and using crop residue help to maintain organic matter content and tilth, reduce crusting, and increase water infiltration.

This soil is well suited to pasture and hay. Establishing and maintaining a mixture of grasses and legumes, using proper stocking rates, rotational and deferred grazing, and using lime and fertilizer help to increase the carrying capacity of pastures. Overgrazing and grazing when the soil is wet cause compaction of the surface layer and damage the stands of grasses and legumes.

Figure 3.—Irrigation on Eunola loam.

The potential productivity for trees on this soil is high, especially for loblolly pine, sweetgum, and yellow-poplar. Seeds and seedlings survive and grow well if competing vegetation is controlled. The soil is soft when wet, thus limiting the use of heavy timber equipment.

The seasonal high water table is the main limitation of the soil for community development, especially as a site for buildings, sanitary landfills or septic tank absorption fields, and most types of recreation.

The capability subclass is IIw.

9A—Kempsville sandy loam, 0 to 2 percent slopes. This soil is deep, nearly level, and well drained. It mostly is at an elevation of at least 50 feet above sea level. The areas of this soil are irregularly shaped and are dissected by drainageways. The areas range from about 2 to 5 acres.

Typically, the surface layer of this soil is brown sandy loam about 6 inches thick. The subsoil extends to a depth of 60 inches or more. It is strong brown sandy clay loam in the upper part. The lower part is mottled and is strong brown sandy loam and yellowish red sandy clay loam.

Included with this soil in mapping are small areas of well drained Suffolk and Emporia soils. The Suffolk soils are intermingled throughout the unit. The Emporia soils are on slightly lower areas and near drainageways. Included soils make up about 15 percent of this unit.

The permeability of this Kempsville soil is moderate, and available water capacity is moderate. Surface runoff is slow. The erosion hazard is slight. The subsoil has a low shrink-swell potential. The root zone extends to a depth of 60 inches or more. The soil is low in organic matter content and natural fertility. It mainly is very strongly acid or strongly acid throughout, but reaction of the surface layer varies because of local liming practices.

Most areas of this soil are in woodland. Some areas are farmed, and a few are in residential developments.

This soil is well suited to cultivated crops. The surface layer is friable and easily tilled, and crops respond well to lime and fertilizer. Conservation tillage, using cover crops and grasses and legumes in the cropping system, and using crop residue help to maintain organic matter

Figure 4.—Hay on Kempsville sandy loam, 0 to 2 percent slopes.

content and tilth, reduce crusting, and increase water infiltration.

This soil is well suited to pasture and hay (fig. 4). Establishing and maintaining a mixture of grasses and legumes, using proper stocking rates, rotational and deferred grazing, and using lime and fertilizer help to increase the carrying capacity of pastures. Overgrazing and grazing when the soil is wet compact the surface layer and damage the stands of grasses and legumes, thus increasing runoff and erosion.

The potential productivity for trees on this soil is moderately high, especially for loblolly pine, yellow-poplar, sweetgum, and southern red oak. The wooded areas are managed for pines and hardwoods. Seeds and seedlings survive and grow well if competing vegetation is controlled.

This soil has few limitations for most types of nonfarm use. The permeability of the subsoil in some areas is a limitation for septic tank absorption fields.

The capability class is I.

9B—Kempsville sandy loam, 2 to 6 percent slopes. This soil is deep, gently sloping, and well drained. It is on uplands and side slopes mostly at an elevation of at least 50 feet above sea level. Slopes commonly are 200 to 600 feet long. The areas of this soil mainly are long and narrow or irregularly shaped and are dissected by drainageways. The areas range from about 5 to 60 acres.

Typically, the surface layer of this soil is brown sandy loam about 6 inches thick. The subsoil extends to a depth of 60 inches or more. It is strong brown sandy clay loam in the upper part. The lower part is mottled and is strong brown sandy loam and yellowish red sandy clay loam.

Included with this soil in mapping are small areas of well drained Bama, Suffolk, and Emporia soils. The Suffolk soils are intermingled throughout the unit. The Bama soils are on slightly lower areas, and the Emporia soils are adjacent to drainageways and depressions. Included soils make up about 20 percent of this unit.

The permeability of this Kempsville soil is moderate, and available water capacity is moderate. Surface runoff is medium. The erosion hazard is moderate. The subsoil has a low shrink-swell potential. The root zone extends to a depth of 60 inches or more. The soil is low in organic matter content and natural fertility. It mainly is very strongly acid or strongly acid throughout, but reaction of the surface layer varies because of local liming practices.

Most areas of this soil are in woodland. Several areas are farmed, and several are in residential developments.

This soil is well suited to cultivated crops. The surface layer is friable and easily tilled, and crops respond well to lime and fertilizer. Conservation tillage, using cover crops and grasses and legumes in the cropping system, and using crop residue help to maintain organic matter content and tilth, reduce crusting, and increase water infiltration. In some areas grassed waterways and diversions also help to reduce runoff and control erosion.

This soil is well suited to pasture and hay. Establishing and maintaining a mixture of grasses and legumes, using proper stocking rates, rotational and deferred grazing, and using lime and fertilizer help to increase the carrying capacity of pastures. Overgrazing and grazing when the soil is wet compact the surface layer and damage the stands of grasses and legumes, thus increasing runoff and erosion.

The potential productivity for trees on this soil is moderately high, especially for loblolly pine, yellow-poplar, sweetgum, and southern red oak. The wooded areas are managed for pines and hardwoods. Seeds and seedlings survive and grow well if competing vegetation is controlled.

This soil has few limitations for most types of nonfarm use. The permeability and slope limit use of the soil as a site for septic tank absorption fields and sewage lagoons, and slope limits the soil as a site for small commercial buildings.

The capability subclass is IIe.

10—Kenansville fine sand. This soil is deep, nearly level to gently sloping, and well drained. It is on lower terrace uplands at an elevation of about 20 to 50 feet above sea level. The areas of this soil are long and narrow or irregularly oval. They range from about 2 to 18 acres. Slopes range from 0 to 4 percent.

Typically, the surface layer of this soil is dark grayish brown fine sand about 14 inches thick. The subsurface layer mostly is yellowish brown loamy fine sand 12 inches thick. The subsoil mostly is brown fine sandy loam 22 inches thick. The substratum is mottled, brownish yellow fine sand to a depth of at least 60 inches.

Included with this soil in mapping are small areas of well drained Suffolk, Kempsville, and Emporia soils and moderately well drained Eunola and Nansemond soils. The Suffolk and Kempsville soils are on slightly higher areas that are away from drainageways, and the Emporia soils are on slightly higher areas that are adjacent to the drainageways. The Eunola and Nansemond soils are in slight depressions mainly adjacent to the drainageways. Also included are small areas of gravelly soils, sandy soils, and soils that are extremely acid in the subsoil. Included soils make up about 15 percent of this unit.

The permeability of this Kenansville soil is moderately rapid, and available water capacity is low. Surface runoff is slow. The hazard of water erosion is slight, but the hazard of wind erosion is moderate. The subsoil has a low shrink-swell potential. The root zone extends to a depth of 60 inches or more. The soil is low in organic matter content and natural fertility. It commonly is very strongly acid or strongly acid throughout, but reaction of the surface layer varies because of local liming practices. A seasonal high water table is at a depth of 4 to 6 feet in winter and spring.

Most areas of this soil are farmed. A few areas are in woodland.

This soil is well suited to cultivated crops. It is droughty during the growing season, however, and the low available water capacity limits crop response to lime and fertilizer. Conservation tillage, using cover crops and grasses and legumes in the cropping system, and using crop residue help to maintain organic matter content and tilth, hold moisture in the soil, and reduce the hazard of wind erosion.

This soil is moderately well suited to pasture and hay. Establishing and maintaining a mixture of grasses and legumes, using proper stocking rates, rotational and deferred grazing, and using lime and fertilizer help to increase the carrying capacity of pastures. Overgrazing cuts the surface layer and damages the stands of grasses and legumes.

The potential productivity for trees on this soil is moderately high, especially for loblolly pine. The low available water capacity and droughty conditions during the growing season limit the survival and growth of seeds and seedlings.

The moderately rapid permeability, the sandy texture of the soil, and the seasonal high water table are the main limitations of the soil for community development. The permeability and water table cause a hazard of ground-water pollution in areas used for septic tank absorption fields and sanitary landfills. The low available water capacity of this soil limits the growth of grasses and shrubs.

The capability subclass is IIs.

11—Kinston-Bibb complex. This unit consists of deep, nearly level, poorly drained soils. The soils are mainly on the flood plains of the Dragon River and other narrow stream bottoms that are flooded frequently by freshwater (fig. 5). The areas are mostly long and narrow and are parallel to the stream channels. They range from about 10 to 500 acres. Slopes range from 0 to 2 percent. The areas are about 45 percent Kinston soils, 35 percent Bibb soils, and 20 percent other soils. The Kinston and Bibb soils are so intermingled that it was not practical to map them separately.

Typically, the surface layer of the Kinston soils is brown loam about 10 inches thick. The substratum extends to a depth of at least 60 inches. The upper part is dark grayish brown clay loam, and the lower part is gray sandy clay loam and sandy loam.

Figure 5.—An area of the Kinston-Bibb complex, adjacent to Dragon Run.

Typically, the surface layer of the Bibb soils is dark grayish brown sandy loam about 10 inches thick. The substratum extends to a depth of at least 60 inches. The upper part of the substratum mostly is gray sandy loam and fine sandy loam. The lower part is mottled, light gray loamy sand and gray sand.

Included with this unit in mapping are small areas of well drained Ochlockonee soils and very poorly drained Pocaty soils. The Ochlockonee soils are in higher, intermittent drainageways. The Pocaty soils have organic layers and are flooded twice daily by brackish water.

The permeability of these Kinston and Bibb soils is moderate, and available water capacity is high. Surface runoff is very slow. The erosion hazard is slight. The subsoil of both soils has a low shrink-swell potential. The root zone extends to a depth of 60 inches or more in both soils, but the rooting depth of some trees is limited by a seasonal high water table, mostly during fall and spring. Both soils are low in organic matter content and natural fertility. They commonly are very strongly acid or strongly acid and are frequently flooded.

Flooding and the seasonal high water table make this unit generally unsuited to farming and are major limitations for most uses other than woodland and wildlife habitat. Most areas are in woodland. The potential productivity for trees is very high for the Kinston soils and high for the Bibb soils, especially for water-tolerant hardwoods such as sweetgum, blackgum, swamp tupelo, green ash, and water oak. These hardwoods generally regenerate naturally after timber is harvested. Flooding and wetness are the main limitations for the use of timber harvesting equipment.

The capability subclass is Vw.

12—Lumbee silt loam. This soil is deep, nearly level, and poorly drained. It is on low-lying terraces at an elevation of less than 20 feet above sea level. The areas of this soil are long and narrow. They range from about 5 to 20 acres. Slopes range from 0 to 2 percent.

Typically, the surface layer of this soil is gray silt loam about 4 inches thick. The subsurface layer is light brownish gray silt loam 3 inches thick. The subsoil is 20 inches thick. The upper part is mottled, grayish brown silt loam. The lower part mostly is mottled, gray loam and sandy loam. The substratum is mostly gray sand and

mottled, brownish yellow sand to a depth of at least 60 inches.

Included with this soil in mapping are small areas of moderately well drained Eunola soils and poorly drained Myatt soils. The Eunola soils are on slightly higher areas, and the Myatt soils are intermingled throughout the unit. Included soils make up about 15 percent of this unit.

The permeability of this Lumbee soil is moderate in the subsoil and rapid in the substratum. The available water capacity is moderate. Surface runoff is very slow. The erosion hazard is slight. The subsoil has a low shrink-swell potential. The root zone extends to a depth of 60 inches or more. The soil is moderate in organic matter content and low in natural fertility. It commonly is very strongly acid or strongly acid throughout, but reaction of the surface layer varies because of local liming practices. A seasonal high water table is between the surface and a depth of 1 foot, and the soil is rarely flooded.

Most areas of this soil are in woodland. A few areas are farmed.

Drained areas of this soil are moderately well suited to cultivated crops. The surface layer is friable and easily tilled. Crops respond well to lime and fertilizer. The soil is wet and cold in spring, and wetness often interferes with tillage. Conservation tillage, using cover crops and grasses and legumes in the cropping system, and using crop residue help to maintain organic matter content and tilth, reduce crusting, and increase water infiltration.

Drained areas of this soil are moderately well suited to pasture and hay. Establishing and maintaining a mixture of grasses and legumes, using proper stocking rates, rotational and deferred grazing, and using lime and fertilizer help to increase the carrying capacity of pastures. Overgrazing and grazing when the soil is wet cause compaction of the surface layer and damage the stands of grasses and legumes.

The potential productivity for trees on this soil is high, especially for loblolly pine and sweetgum. Seeds and seedlings grow well only if competing vegetation is controlled and if drainage is provided. The soil is soft when wet, thus limiting the use of heavy timber equipment.

The seasonal high water table, the sandy texture of the substratum, and flooding are the main limitations of the soil for community development. The seasonal high water table and flooding limit use of the soil as a building site, as a site for sanitary landfills or septic tank absorption fields, and for many types of recreation. The water table and the low strength of the substratum limit excavations.

The capability subclass is VIw.

13—Myatt loam. This soil is deep, nearly level, and poorly drained. It is mostly on low-lying terraces and broad flats at an elevation of less than 20 feet above sea level. The areas of this soil commonly are long and narrow, but some smaller areas are irregularly oval. The areas range from about 3 to 50 acres. Slopes range from 0 to 2 percent.

Typically, the surface layer of this soil is dark grayish brown loam about 4 inches thick. The subsurface layer is light brownish gray loam 7 inches thick. The subsoil is 38 inches thick. The upper part is mottled, light brownish gray clay loam. The lower part is mostly mottled, gray clay loam, sandy clay loam, and fine sandy loam. The substratum is mottled, gray loamy fine sand to a depth of at least 60 inches.

Included with this soil in mapping are small areas of moderately well drained Eunola and Nansemond soils, moderately well drained and somewhat poorly drained Pactolus soils, and poorly drained Bibb and Kinston soils. The Eunola, Nansemond, and Pactolus soils are on slightly higher areas adjacent to higher terraces or uplands. The Bibb and Kinston soils are adjacent to drainageways. Included soils make up about 20 percent of this unit.

The permeability of this Myatt soil is moderate, and available water capacity is moderate. Surface runoff is slow. The erosion hazard is slight. The subsoil has a low shrink-swell potential. The root zone extends to a depth of 60 inches or more. The soil is low in organic matter content and natural fertility. It commonly is very strongly acid or strongly acid throughout, but reaction of the surface layer varies because of local liming practices. A seasonal high water table is between the surface and a depth of 1 foot during winter and spring.

Most areas of this soil are in woodland. A few areas are farmed.

Drained areas of this soil are moderately well suited to cultivated crops. The surface layer is friable and easily tilled. Crops respond well to lime and fertilizer. The soil is wet and cold in spring, and wetness often interferes with tillage. Conservation tillage, using cover crops and grasses and legumes in the cropping system, and using crop residue help to maintain organic matter content and tilth, reduce crusting, and increase water infiltration.

Drained areas of this soil are moderately well suited to pasture and hay. Establishing and maintaining a mixture of grasses and legumes, using proper stocking rates, rotational and deferred grazing, and using lime and fertilizer help to increase the carrying capacity of pastures. Overgrazing and grazing when the soil is wet cause compaction of the surface layer and damage the stands of grasses and legumes.

The potential productivity for trees on this soil is high, especially for loblolly pine and sweetgum. Seeds and seedlings grow well only if competing vegetation is controlled and if drainage is provided. The soil is soft when wet, thus limiting the use of heavy timber equipment.

The seasonal high water table is the main limitation of the soil for community development, especially as a site

for buildings, sanitary landfills or septic tank absorption fields, and most types of recreation.

The capability subclass is IVw.

14—Nansemond loamy fine sand. This soil is deep, nearly level, and moderately well drained. It is mostly on the lower terraces near drainageways. The areas of this soil are irregularly shaped. They range from about 2 to 25 acres. Slopes range from 0 to 2 percent.

Typically, the surface layer of this soil is brown loamy fine sand about 10 inches thick. The subsurface layer is loamy fine sand 8 inches thick. The subsoil is 26 inches thick. It mostly is dark yellowish brown fine sandy loam in the upper part and mottled, yellowish brown sand loam in the lower part. The substratum is mottled, yellowish brown loamy sandy to a depth of at least 60 inches.

Included with this soil in mapping are small areas of moderately well drained Eunola and Ackwater soils and poorly drained Myatt soils. The Eunola soils are intermingled throughout the unit. The Ackwater soils are in slightly lower areas and mainly are close to the heads of drainageways. The Myatt soils are in depressions throughout the unit and at the heads of drainageways. Included soils make up about 15 percent of this unit.

The permeability of this Nansemond soil is moderately rapid in the upper part and rapid in the substratum. The available water capacity is low. Surface runoff is slow. The erosion hazard is slight. The subsoil has a low shrink-swell potential. The root zone extends to a depth of 60 inches or more. The soil is low in organic matter content and natural fertility. It commonly is extremely acid through strongly acid, but reaction of the surface layer varies because of local liming practices. A seasonal high water table is at a depth of 1½ to 2½ feet during winter and spring.

Most areas of this soil are farmed. Some areas are mostly in woodland.

This soil is well suited to cultivated crops. The surface layer is friable and easily tilled. Crop response to lime and fertilizer commonly is limited by the low available water capacity during the growing season. This soil is wet and cold in spring, and wetness often interferes with tillage. Drainage helps to alleviate wetness and protects crops from damage. Conservation tillage, using cover crops and grasses and legumes in the cropping system, and using crop residue help to maintain organic matter content and tilth, reduce crusting, and increase water retention during the growing season.

This soil is well suited to pasture and hay. Establishing and maintaining a mixture of grasses and legumes, using proper stocking rates, rotational and deferred grazing, and using lime and fertilizer help to increase the carrying capacity of pastures. Overgrazing and grazing when the soil is wet cause compaction of the surface layer and damage the stands of grasses and legumes.

The potential productivity for trees on this soil is high, especially for loblolly pine, yellow-poplar, and sweet gum. Seeds and seedlings survive and grow well only if competing vegetation is controlled. The soil is soft when wet, thus limiting the use of heavy timber equipment during wet periods.

The seasonal high water table and the rapid permeability of the substratum are the main limitations of the soil for community development. They cause a hazard of ground-water pollution in areas used for septic tank absorption fields or landfills.

The capability subclass is IIw.

15—Ochlockonee silt loam. This soil is deep, mostly nearly level, and well drained. It is at the base of terraces and in intermittent drainageways. The areas of this soil mostly are long and narrow. They range from about 3 to 10 acres. Slopes range from 0 to 3 percent.

Typically, the surface layer of this soil is brown silt loam about 7 inches thick. The substratum extends to a depth of 60 inches or more. The upper part is yellowish brown loam, and the lower part is dark grayish brown and yellowish brown sandy loam.

Included with this soil in mapping are small areas of well drained Emporia and Kenansville soils, moderately well drained and somewhat poorly drained Pactolus soils, and poorly drained Bibb and Kinston soils. The Emporia and Kenansville soils are on slightly higher, convex areas of the unit. The Pactolus soils are in slight depressions throughout the unit. The Bibb and Kinston soils are in drainageways. Also included are small areas of gravelly soils and sandy soils. Included soils make up about 25 percent of this unit.

The permeability of this Ochlockonee soil is moderate, and available water capacity is moderate. Surface runoff is slow. The erosion hazard is slight. The substratum has a low shrink-swell potential. The soil is low in organic matter content and natural fertility. It commonly is very strongly acid or strongly acid throughout, but reaction of the surface layer varies because of local liming practices. The soil is frequently flooded for very brief periods, mostly during winter and spring. A seasonal high water table is at a depth of 3 to 4 feet during winter and spring.

Most areas of this soil are in woodland. A few areas are cultivated or in pasture.

This soil is moderately well suited to cultivated crops. The position of the soil on the landscape and the shape of the areas are the main limitations for cultivated crops. The surface layer is friable and easily tilled. Crops respond well to lime and fertilizer. The soil is wet and cold in spring, and wetness often interferes with tillage. Crops commonly are damaged by very brief flooding during the spring, and providing drainage and flood control are management concerns. Conservation tillage, using cover crops and grasses and legumes in the cropping system, and using crop residue help to maintain

organic matter content and tilth, reduce crusting, and increase water infiltration.

This soil is moderately well suited to pasture and hay. Establishing and maintaining a mixture of grasses and legumes, using proper stocking rates, rotational and deferred grazing, and using lime and fertilizer help to increase the carrying capacity of pastures. Overgrazing and grazing when the soil is wet cause compaction of the surface layer and damage the stands of grasses and legumes.

The potential productivity for trees on this soil is very high, especially for loblolly pine, yellow-poplar, and sweetgum. Seeds and seedlings survive and grow well only if competing vegetation is controlled. The soil is soft when wet, thus limiting the use of heavy timber equipment during wet periods.

Flooding and the seasonal high water table are the main limitations of this soil for most types of community development, especially for use as a site for septic tank absorption fields, buildings, and most types of recreation.

The capability subclass is IVw.

16—Pactolus loamy fine sand. This soil is deep, nearly level to gently sloping, and moderately well drained to somewhat poorly drained. It is along drainageways on low-lying terraces that are mostly at an elevation of 20 to 50 feet above sea level. The areas of this soil commonly are long and narrow. The areas range from about 3 to 18 acres. Slopes range from 0 to 4 percent.

Typically, the surface layer of this soil is dark brown loamy fine sand about 8 inches thick. The substratum extends to a depth of at least 80 inches. The upper part is light yellowish brown and yellowish brown loamy fine sand. The lower part is mottled, yellowish brown gray and brown fine sand.

Included with this soil in mapping are small areas of somewhat excessively drained Catpoint soils; well drained Kenansville, Rumford, and Suffolk soils; moderately well drained Eunola and Nansemond soils; and poorly drained Myatt soils. The Catpoint, Kenansville, Rumford, and Suffolk soils are on slightly higher convex areas. The Eunola and Nasemond soils mainly are along the perimeter of the unit. The Myatt soils are on slightly lower concave areas that are adjacent to drainageways. Included soils make up about 20 percent of this unit.

The permeability of this Pactolus soil is rapid, and available water capacity is low. Surface runoff is slow. The erosion hazard is slight. The substratum has a low shrink-swell potential. The root zone extends to a depth of 60 inches or more. The soil is low in organic matter content and natural fertility. It commonly is very strongly acid or strongly acid throughout, but reaction of the surface layer varies because of local liming practices. A seasonal high water table is at a depth of 1½ to 3 feet from late fall through early spring.

Most areas of this soil are in woodland. A few areas are cultivated or in pasture.

This soil is moderately well suited to cultivated crops. The surface layer is very friable and easily tilled through a wide range of moisture conditions; however, seasonal wetness often delays tillage in the early spring. Crop response to lime and fertilizer is limited in some areas by the low available water capacity. Conservation tillage, using cover crops and grasses and legumes in the cropping system, and using crop residue help to maintain organic matter and tilth and hold moisture in the soil.

This soil is moderately well suited to pasture and hay. Establishing and maintaining a mixture of grasses and legumes, using proper stocking rates, rotational and deferred grazing, and using lime and fertilizer help to increase the carrying capacity of pastures. Overgrazing cuts the surface layer and damages the stands of grasses and legumes.

The potential productivity for trees on this soil is moderately high, especially for loblolly pine, sweetgum, and oaks. The survival of seeds and seedlings is hindered by the low available water during the growing season. The soil is soft, especially when wet, and the use of heavy timber equipment is limited during wet periods.

The rapid permeability of the substratum, the seasonal high water table, and the sandy texture of the soil are the main limitations for community development. The permeability and seasonal high water table cause a hazard of ground-water pollution in areas used for septic tank absorption fields or sanitary landfills. The sandy texture limits excavation, and the surface of the soil is dusty when dry. The low available water capacity of this soil limits the growth of grasses and shrubs.

The capability subclass is IIIs.

17—Pocaty muck. This soil is deep, nearly level, and very poorly drained. It is in tidal marshes mainly along the Rappahannock and Piankatank Rivers and some major creeks. The areas of this soil mostly are long and narrow and range from about 2 to 50 acres. Slopes are less than 1 percent.

Typically, this soil consists of black muck to a depth of at least 72 inches.

Included with this soil in mapping are small areas of poorly drained Bibb and Kinston soils at slightly higher elevations that are flooded by freshwater. Included soils make up about 10 percent of this unit.

The permeability of this Pocaty soil is moderate. Available water capacity is very high, but the water is brackish. Surface runoff is very slow. The shrink-swell potential is low. The soil ranges from very strongly acid through neutral, but upon drying or exposure to air it becomes extremely acid. Organic matter is the dominant component of this soil. The soil is frequently flooded by wind tides and is continuously saturated.

Most areas of this soil are in natural grasses and sedges, mostly black needlerush, cattails, olney threesquare, and cordgrass.

Low strength, flooding, and the high organic matter and sulfur contents of this soil preclude its use for most purposes other than as a wetland wildlife habitat.

The capability subclass is VIIIw.

18A—Rumford fine sandy loam, 0 to 2 percent slopes. This soil is deep, nearly level, and well drained. It mainly is adjacent to drainageways on the lower terraces that are at an elevation of 20 to 50 feet above sea level. The areas of this soil are oval. They range from about 2 to 16 acres.

Typically, the surface layer of this soil is dark brown fine sandy loam about 2 inches thick. The subsurface layer is yellowish brown fine sandy loam 12 inches thick. The subsoil is strong brown fine sandy loam 23 inches thick. The substratum extends to a depth of 60 inches or more. The upper part is yellowish brown fine sandy loam and loamy fine sand. The lower part is mottled, yellow fine sand.

Included with this soil in mapping are small areas of somewhat excessively drained Catpoint soils, well drained Kenansville and Suffolk soils, moderately well drained Eunola and Nansemond soils, and moderately well drained and somewhat poorly drained Pactolus soils. The Catpoint soils are in slightly lower areas close to the drainageways. The Kenansville soils are in slightly concave areas adjacent to higher terraces or uplands. The Suffolk soils are in slightly higher areas farther from the drainageways. The Eunola, Nansemond, and Pactolus soils are in slight depressions and are adjacent to drainageways. Included soils make up about 20 percent of this unit.

The permeability of this Rumford soil is moderately rapid, and available water capacity is low. Surface runoff is slow. The erosion hazard from water is slight, but the hazard of erosion from wind is moderate. The subsoil has low shrink-swell potential. The root zone extends to a depth of 60 inches or more. The soil is low in organic matter content and natural fertility. It commonly is very strongly acid or strongly acid throughout, but reaction of the surface layer varies because of local liming practices.

Most areas of this soil are farmed. Some areas are in woodland.

This soil is well suited to cultivated crops. The surface layer is very friable and easily tilled, but the low available water capacity commonly limits crop response to lime and fertilizer during the growing season. Conservation tillage, using cover crops and grasses and legumes in the cropping system, and using crop residue help to maintain organic matter content and tilth, reduce erosion, and hold moisture in the soil.

This soil is well suited to pasture and hay. Establishing and maintaining a mixture of grasses and legumes, using proper stocking rates, rotational and deferred grazing, and using lime and fertilizer help to increase the carrying capacity of pastures. Overgrazing causes compaction of the surface layer and damages the stands of grasses and legumes.

The potential productivity for trees on this soil is moderately high, especially for loblolly pine and Virginia pine. The germination of seeds and the survival of seedlings commonly are limited by the low available water during the growing season.

The moderately rapid permeability of the subsoil and the sandy texture of the substratum are the main limitations of the soil for community development. The permeability causes a hazard of ground-water pollution in areas used for septic tank absorption fields or sanitary landfills. The sandy texture limits excavation, and the surface of the soil is dusty when dry. The low available water capacity of this soil limits the growth of grasses and shrubs.

The capability class is I.

18B—Rumford fine sandy loam, 2 to 6 percent slopes. This soil is deep, gently sloping, and well drained. It mainly is adjacent to drainageways on the lower terraces that are at an elevation of 20 to 50 feet above sea level. Slopes commonly are 100 to 300 feet long. The areas of this soil are oval. They range from about 2 to 16 acres.

Typically, the surface layer of this soil is dark brown fine sandy loam about 2 inches thick. The subsurface layer is yellowish brown fine sandy loam 12 inches thick. The subsoil is strong brown fine sandy loam 23 inches thick. The substratum extends to a depth of 60 inches or more. The upper part is yellowish brown fine sandy loam and loamy fine sand. The lower part is mottled, yellow fine sand.

Included with this soil in mapping are small areas of somewhat excessively drained Catpoint soils, well drained Kenansville and Suffolk soils, moderately well drained Eunola and Nansemond soils, and moderately well drained and somewhat poorly drained Pactolus soils. The Catpoint soils are in slightly lower areas close to the drainageways. The Kenansville soils are in slightly concave areas adjacent to higher terraces or uplands. The Suffolk soils are in slightly higher areas farther from the drainageways. The Eunola, Nansemond, and Pactolus soils are in slight depressions and are adjacent to drainageways. Included soils make up about 20 percent of this unit.

The permeability of this Rumford soil is moderately rapid, and available water capacity is low. Surface runoff is medium. The hazard of erosion from water and wind is moderate. The subsoil has low shrink-swell potential. The root zone extends to a depth of 60 inches or more. The soil is low in organic matter content and natural fertility. It commonly is very strongly acid or strongly acid

throughout, but reaction of the surface layer varies because of local liming practices.

Most areas of this soil are farmed. Some areas are in woodland.

This soil is well suited to cultivated crops. The surface layer is very friable and easily tilled, but the low available water capacity commonly limits crop response to lime and fertilizer during the growing season. Conservation tillage, using cover crops and grasses and legumes in the cropping system, and using crop residue help to maintain organic matter content and tilth, reduce erosion, and hold moisture in the soil.

This soil is well suited to pasture and hay. Establishing and maintaining a mixture of grasses and legumes, using proper stocking rates, rotational and deferred grazing, and using lime and fertilizer help to increase the carrying capacity of pastures. Overgrazing causes compaction of the surface layer and damages the stands of grasses and legumes.

The potential productivity for trees on this soil is moderately high, especially for loblolly pine and Virginia pine. The germination of seeds and the survival of seedlings commonly are limited by the low available water during the growing season.

The moderately rapid permeability of the subsoil and the sandy texture of the substratum are the main limitations of the soil for community development. The permeability causes a hazard of ground-water pollution in areas used for septic tank absorption fields or sanitary landfills. The sandy texture limits excavation, and the surface of the soil is dusty when dry. The low available water capacity of this soil limits the growth of grasses and shrubs.

The capability subclass is IIe.

19A—Slagle silt loam, 0 to 2 percent slopes. This soil is deep, nearly level, and moderately well drained. It is on low-lying terrace uplands and on broad flats of uplands at an elevation of more than 50 feet above sea level. The areas of this soil commonly are long and narrow. They range from about 5 to 80 acres.

Typically, the surface layer of this soil is grayish brown silt loam about 9 inches thick. The subsoil extends to a depth of at least 60 inches. The upper part mostly is pale brown silt loam and light yellowish brown loam. The lower part is mottled, multicolored loam.

Included with this soil in mapping are small areas of well drained Emporia soils and moderately well drained Eunola soils. The Emporia soils are on slightly higher areas throughout the unit. The Eunola soils are in slight depressions and near drainageways. Included soils make up about 20 percent of this unit.

The permeability of this Slagle soil is moderate in the upper part of the subsoil and moderately slow or slow in the lower part. The available water capacity is moderate. Surface runoff is slow. The erosion hazard is slight. The subsoil has moderate shrink-swell potential. The root zone extends to a depth of 60 inches or more. The soil is low in organic matter content and natural fertility. It commonly is very strongly acid or strongly acid throughout, but reaction of the surface layer varies because of local liming practices. A seasonal high water table is perched at a depth of 1½ to 3 feet during winter and spring.

Most areas of this soil are in woodland. A few areas are cultivated or in pasture.

This soil is well suited to cultivated crops. The surface layer is friable and easily tilled, and crops respond well to lime and fertilizer. However, the soil commonly is wet and cold in spring, and wetness often delays tillage. Drainage in some areas alleviates wetness and helps to protect crops from damage. Conservation tillage, using cover crops and grasses and legumes in the cropping system, and using crop residue help to maintain organic matter content and tilth, reduce crusting, and increase water infiltration.

This soil is well suited to pasture and hay. Establishing and maintaining a mixture of grasses and legumes, using proper stocking rates, rotational and deferred grazing, and using lime and fertilizer help to increase the carrying capacity of pastures. Overgrazing and grazing when the soil is wet cause compaction of the surface layer and damage the stands of grasses and legumes.

The potential productivity for trees on this soil is high, especially for loblolly pine, oak, and sweetgum. Seeds and seedlings survive and grow well if competing vegetation is controlled. The soil is soft when wet, and thus the use of heavy timber equipment is limited during wet periods.

The seasonal high water table, low strength, and slow or moderately slow permeability of the subsoil are the main limitations of the soil for community development. The high water table and the permeability of the subsoil limit the use of the soil as a building site or as a site for sanitary landfills, septic tank absorption fields, and most types of recreation. The low strength limits its use as a subgrade material for roads and streets.

The capability subclass is IIw.

19B—Slagle silt loam, 2 to 6 percent slopes. This soil is deep, gently sloping, and moderately well drained. It is on low-lying terrace uplands and on broad flats of uplands at an elevation of more than 50 feet above sea level. Slopes commonly are 75 to 350 feet in length. The areas of this soil commonly are long and narrow. They range from about 5 to 100 acres.

Typically, the surface layer of this soil is grayish brown silt loam about 9 inches thick. The subsoil extends to a depth of at least 60 inches. The upper part mostly is pale brown silt loam and light yellowish brown loam. The lower part is mottled, multicolored loam.

Included with this soil in mapping are small areas of well drained Emporia soils and moderately well drained Eunola soils. The Emporia soils are on slightly higher

areas throughout the unit. The Eunola soils are in slight depressions and near drainageways. Included soils make up about 20 percent of this unit.

The permeability of this Slagle soil is moderate in the upper part of the subsoil and moderately slow or slow in the lower part. The available water capacity is moderate. Surface runoff is medium. The erosion hazard is moderate. The subsoil has moderate shrink-swell potential. The root zone extends to a depth of 60 inches or more. The soil is low in organic matter content and natural fertility. It commonly is very strongly acid or strongly acid throughout, but reaction of the surface layer varies because of local liming practices. A seasonal high water table is perched at a depth of 1½ to 3 feet during winter and spring.

Most areas of this soil are in woodland. A few areas are cultivated or in pasture.

This soil is well suited to cultivated crops. The surface layer is friable and easily tilled, and crops respond well to lime and fertilizer. However, the soil is wet and cold in spring, and wetness often delays tillage. Drainage in some areas alleviates wetness and helps to protect crops from damage. Conservation tillage, using cover crops and grasses and legumes in the cropping system, and using crop residue are practices that help to maintain organic matter content and tilth, reduce crusting, increase water infiltration, and control erosion. Grassed waterways and diversions in some areas also help to control erosion.

This soil is well suited to pasture and hay. Establishing and maintaining a mixture of grasses and legumes, using proper stocking rates, rotational and deferred grazing, and using lime and fertilizer help to increase the carrying capacity of pastures. Overgrazing and grazing when the soil is wet cause compaction of the surface layer and damage the stands of grasses and legumes.

The potential productivity for trees on this soil is high, especially for loblolly pine, oak, and sweetgum. Seeds and seedlings survive and grow well if competing vegetation is controlled. The soil is soft when wet, and thus the use of heavy timber equipment is limited during wet periods.

The seasonal high water table, low strength, and slow or moderately slow permeability of the subsoil are the main limitations of the soil for community development. The high water table and the permeability of the subsoil limit the use of the soil as a building site or as a site for sanitary landfills, septic tank absorption fields, and most types of recreation. The low strength limits its use as a subgrade material for roads and streets.

The capability subclass is IIe.

20A—Suffolk fine sandy loam, 0 to 2 percent slopes. This soil is deep, nearly level, and well drained. It is on uplands at an elevation of mostly more than 20 feet above sea level. The areas of this soil commonly are long and narrow and are dissected by drainageways. The areas range from about 5 to 150 acres.

Typically, the surface layer of this soil is dark yellowish brown fine sandy loam about 8 inches thick. The subsurface layer is yellowish brown fine sandy loam 4 inches thick. The subsoil is 26 inches thick. The upper part is light brown fine sandy loam, and the lower part is strong brown sandy clay loam and fine sandy loam. The substratum extends to a depth of 60 inches or more. It is brownish yellow loamy sand and mottled, very pale brown fine sand.

Included with this soil in mapping are small areas of well drained Kempsville and Rumford soils and moderately well drained Eunola soils. The Kempsville and Rumford soils are intermingled throughout the unit. The Eunola soils are in slightly lower areas and slight depressions. Also included are small areas of sandy soils. Included soils make up about 15 percent of this unit.

The permeability of this Suffolk soil is moderate, and available water capacity is moderate. Surface runoff is slow. The hazard of erosion from water is slight, but the hazard of erosion from wind is moderate. The subsoil has low shrink-swell potential. The root zone extends to a depth of 60 inches or more. The soil is low in organic matter content and natural fertility. It commonly is very strongly acid or strongly acid throughout, but reaction of the surface layer varies because of local liming practices.

Most areas of this soil are farmed. Some areas are in woodland, and some are in residential developments.

This soil is well suited to cultivated crops. The surface layer is friable and easily tilled through a wide range of moisture conditions. Crops generally respond well to lime and fertilizer, but crop response is limited by low available water capacity in some of the included sandy areas. Conservation tillage, using cover crops and grasses and legumes in the cropping system, and using crop residue help to maintain organic matter content and tilth, reduce crusting, control erosion, and hold moisture in the soil.

This soil is well suited to pasture and hay. Establishing and maintaining a mixture of grasses and legumes, using proper stocking rates, rotational and deferred grazing, and using lime and fertilizer help to increase the carrying capacity of pastures. Overgrazing causes compaction of the surface layer and damages the stands of grasses and legumes.

The potential productivity for trees on this soil is moderately high, especially for loblolly pine, Virginia pine, yellow-poplar, sweetgum, and oak. Seeds and seedlings grow well if competing vegetation is controlled.

Rapid permeability in the substratum is the main limitation of the soil for community development. The permeability causes a hazard of ground-water pollution in areas used for septic tank absorption fields, sewage lagoons, or sanitary landfills.

The capability class is I.

20B—Suffolk fine sandy loam, 2 to 6 percent slopes. This soil is deep, gently sloping, and well drained. It is on uplands at an elevation of mostly more than 20 feet above sea level. Slopes range from about 200 to 600 feet long. The areas of this soil commonly are long and narrow and are dissected by drainageways. The areas range from about 5 to 150 acres.

Typically, the surface layer of this soil is dark yellowish brown fine sandy loam about 8 inches thick. The subsurface layer is yellowish brown fine sandy loam 4 inches thick. The subsoil is 26 inches thick. The upper part is light brown fine sandy loam, and the lower part is strong brown sandy clay loam and fine sandy loam. The substratum extends to a depth of 60 inches or more. It is brownish yellow loamy sand and mottled, very pale brown fine sand.

Included with this soil in mapping are small areas of well drained Kempsville and Rumford soils and moderately well drained Eunola soils. The Kempsville and Rumford soils are intermingled throughout the unit. The Eunola soils are in slightly lower areas and slight depressions. Also included are small areas of sandy soils. Included soils make up about 20 percent of this unit.

The permeability of this Suffolk soil is moderate, and available water capacity is moderate. Surface runoff is medium. The hazard of erosion from water and wind is moderate. The subsoil has low shrink-swell potential. The root zone extends to a depth of 60 inches or more. The soil is low in organic matter content and natural fertility. It commonly is very strongly acid or strongly acid throughout, but reaction of the surface layer varies because of local liming practices.

Most areas of this soil are farmed. Some areas are in woodland, and some are in residential developments.

This soil is well suited to cultivated crops. The surface layer is friable and easily tilled through a wide range of moisture conditions. Crops generally respond well to lime and fertilizer, but crop response is limited by low available water capacity in some included sandy areas. Conservation tillage, using cover crops and grasses and legumes in the cropping system, and using crop residue help to maintain organic matter content and tilth, reduce crusting, control erosion, and hold moisture in the soil. Grassed waterways and diversions in some areas also help to control erosion.

This soil is well suited to pasture and hay. Establishing and maintaining a mixture of grasses and legumes, using proper stocking rates, rotational and deferred grazing, and using lime and fertilizer help to increase the carrying capacity of pastures. Overgrazing causes compaction of the surface layer and damages the stands of grasses and legumes.

The potential productivity for trees on this soil is moderately high, especially for loblolly pine, Virginia pine, yellow-poplar, sweetgum, and oak. Seeds and seedlings grow well if competing vegetation is controlled.

Rapid permeability in the substratum is the main limitation of the soil for community development. The permeability causes a hazard of ground-water pollution in areas used for septic tank absorption fields, sewage lagoons, or sanitary landfills.

The capability subclass is IIe.

21D—Suffolk-Remlik complex, 6 to 15 percent slopes. This unit consists of deep, strongly sloping to moderately steep, well drained soils. The soils are on side slopes of terrace breaks and drainageways. Slopes commonly are smooth and convex and are about 75 to 400 feet in length. The areas of these soils are mostly long and narrow and parallel to the drainageways and range from about 5 to 25 acres. The areas are about 50 percent Suffolk soils, 40 percent Remlik soils, and 10 percent other soils. The Suffolk and Remlik soils are so intermingled that it was not practical to map them separately.

Typically, the surface layer of the Suffolk soils is dark yellowish brown fine sandy loam about 8 inches thick. The subsurface layer is yellowish brown fine sandy loam 4 inches thick. The subsoil is 26 inches thick. The upper part is light brown fine sandy loam, and the lower part is strong brown sandy clay loam and fine sandy loam. The substratum extends to a depth of 60 inches or more. It is brownish yellow loamy sand and mottled, very pale brown fine sand.

Typically, the surface layer of the Remlik soils is dark grayish brown loamy sand about 3 inches thick. The subsurface layer is light yellowish brown loamy sand 24 inches thick. The subsoil is strong brown sandy loam and sandy clay loam 14 inches thick. The substratum extends to a depth of 60 inches or more. It is brownish yellow loamy fine sand and strong brown bands of sandy loam.

Included with this unit in mapping are small areas of well drained Ochlockonee and Emporia soils, moderately well drained Craven soils, and poorly drained Bibb and Kinston soils. The Ochlockonee soils are in drainageways. The Emporia and Craven soils are intermingled throughout the unit. The Bibb and Kinston are in narrow drainageways. Also included are small areas of gravelly soils and soils with layers of ironstone.

The permeability of these Suffolk and Remlik soils is moderate. The available water capacity is moderate in the Suffolk soils and low in the Remlik soils. Surface runoff is medium to rapid, and the erosion hazard is severe. The subsoil of both soils has a low shrink-swell potential. The root zone extends to a depth of 60 inches or more. Both soils are low in organic matter content and natural fertility. The Suffolk soils commonly are very strongly acid or strongly acid, and the Remlik soils range from extremely acid through moderately acid. The Remlik

soils have a seasonal high water table perched at a depth of 4 to 6 feet.

Most areas of these soils are in woodland. A few areas are farmed.

The steepness and complexity of slope limit the use of farm equipment and make these soils generally unsuitable for farming (fig. 6). Some small areas are farmed, especially on some of the strongly sloping soils. The severe erosion hazard in these areas is a major management concern. Conservation tillage, using cover crops and grasses and legumes in the cropping system, and using crop residue help to maintain organic matter content and tilth, control erosion, and increase water infiltration. Grassed waterways and diversions also help to control surface runoff and reduce erosion.

The potential productivity for trees on these soils is moderately high. Most of the acreage is in woodland and is managed for loblolly pine, sweetgum, and oak. Placing logging roads and skid trails on the contour of the landscape helps to reduce the concentration of runoff and thereby control erosion.

Rapid permeability in the substratum of both soils, the seasonal high water table in the Remlik soils, the sandy substratum of both soils, and slope are the main limitations for community development. The rapid permeability and the seasonal high water table cause a hazard of ground-water pollution in areas used for septic tank absorption fields or sanitary landfills. The sandy surface layer of the Remlik soils and the sandy substratum of both soils limit excavation. Slope also limits the use of these soils as a site for sanitary facilities, as a building site, and for most types of recreation.

The capability subclass is IVe.

21F—Suffolk-Remlik complex, 15 to 45 percent slopes. This unit consists of deep, steep to very steep, well drained soils. The soils are on side slopes of terrace breaks and drainageways. Slopes commonly are smooth and convex and are about 75 to 400 feet in length. The

Figure 6.—Erosion is a hazard on the short, steep slopes of the Suffolk-Remlik complex, 6 to 15 percent slopes.

areas of these soils mostly are long and narrow and parallel to the drainageways. They range from about 5 to 100 acres. The areas are about 50 percent Suffolk soils, 40 percent Remlik soils, and 10 percent other soils. The Suffolk and Remlik soils are so intermingled that it was not practical to map them separately.

Typically, the surface layer of the Suffolk soils is dark yellowish brown fine sandy loam about 8 inches thick. The subsurface layer is yellowish brown fine sandy loam 4 inches thick. The subsoil is 26 inches thick. The upper part is light brown fine sandy loam, and the lower part is strong brown sandy clay loam and fine sandy loam. The substratum extends to a depth of 60 inches or more. It is brownish yellow loamy sand and mottled, very pale brown fine sand.

Typically, the surface layer of the Remlik soils is dark grayish brown loamy sand about 3 inches thick. The subsurface layer is light yellowish brown loamy sand 24 inches thick. The subsoil is strong brown sandy loam and sandy clay loam 14 inches thick. The substratum extends to a depth of 60 inches or more. It is brownish yellow loamy fine sand and strong brown bands of sandy loam.

Included with this unit in mapping are small areas of well drained Ochlockonee and Emporia soils, moderately well drained Craven soils, and poorly drained Bibb and Kinston soils. The Ochlockonee soils are in drainageways. The Emporia and Craven soils are intermingled throughout the unit. Bibb and Kinston soils are in narrow drainageways. Also included are small areas of gravelly soils and soils with layers of ironstone.

The permeability of these Suffolk and Remlik soils is moderate. The available water capacity is moderate in the Suffolk soils and low in the Remlik soils. Surface runoff is very rapid, and the erosion hazard is severe. The subsoil of both soils has a low shrink-swell potential. The root zone extends to a depth of 60 inches or more. Both soils are low in organic matter content and natural fertility. The Suffolk soils commonly are very strongly acid or strongly acid, and the Remlik soils range from extremely acid through moderately acid. The Remlik soils have a seasonal high water table perched at a depth of 4 to 6 feet.

Slope limits the use of farm equipment and makes these soils generally unsuitable for farming. The potential productivity for trees on these soils is moderately high. Most of the acreage is in woodland and is managed for loblolly pine, sweetgum, and oaks; however, slope also limits the safe operation of heavy timber equipment. Placing logging roads and skid trails on the contour of the landscape helps to reduce the concentration of runoff and thereby control erosion.

Slope is the main limitation of these soils for community development, especially for recreation sites, building sites, and septic tank absorption fields.

The capability subclass is VIIe.

22B—Udorthents and Psamments, gently sloping. This unit consists of areas throughout the survey area that have been disturbed during construction. Some areas have been excavated, and some areas have been filled. The soils are deep, well drained to moderately well drained, and loamy and sandy. Slopes are complex and range from nearly level to steep, but most areas are gently sloping. The areas mostly are rectangular or irregularly shaped. They range from about 3 to 25 acres. Some areas consist mostly of Udorthents, some mostly of Psamments, and some of both. The Udorthents and Psamments were mapped together because they have no major differences in use and management. The total acreage of the unit is about 50 percent Udorthents, 40 percent Psamments, and 10 percent soils that have not been altered by construction activities.

The excavated areas are generally the steepest part of this unit. The material exposed in the excavated areas mostly is loamy, but some areas are sand. The filled areas generally are mixed material removed from the excavated areas and are not as steep as the excavated areas. Some filled areas are highly compacted.

The properties and characteristics of this unit are so variable that an onsite investigation is generally needed to determine the suitability and potential of the unit for most uses.

This unit is not assigned to a capability subclass.

Prime Farmland

Prime farmland is one of several kinds of important farmlands defined by the U.S. Department of Agriculture. It is of major importance in meeting the Nation's short- and long-range needs for food and fiber. The supply of high quality farmland is limited, and the U.S. Department of Agriculture recognizes that responsible levels of government, as well as individuals, must encourage and facilitate the use of our Nation's prime farmland with wisdom and foresight.

Prime farmland, as defined by the U.S. Department of Agriculture, is the land that is best suited to producing food, feed, forage, fiber, and oilseed crops. It has the soil quality, growing season, and moisture supply needed to economically produce a sustained high yield of crops when it is treated and managed using acceptable farming methods. Prime farmland produces the highest yields with minimal inputs of energy and economic resources, and farming it results in the least damage to the environment.

Prime farmland may now be in crops, pasture, woodland, or other land, but not in urban or built-up land or water areas. It must either be used for producing food or fiber or be available for these uses.

Prime farmland usually has an adequate and dependable supply of moisture from precipitation or irrigation. It also has favorable temperature and growing season and acceptable levels of acidity or alkalinity. It has few or no rocks and is permeable to water and air. Prime farmland is not excessively erodible or saturated with water for long periods and is not flooded during the growing season. The slope range is mainly from 0 to 6 percent. For more detailed information on the criteria for prime farmland consult the local staff of the Soil Conservation Service.

About 50,340 acres, or nearly 60 percent of the land area, in Middlesex County meets the soil requirements for prime farmland. A recent trend in land use in some parts of the survey area has been toward the loss of some prime farmlands to industrial and urban uses. The loss of prime farmland to other uses puts pressure on marginal lands, which generally are more erodible, droughty, and difficult to cultivate and usually are less productive.

Soil map units that make up prime farmland in Middlesex County are listed in table 5. This list does not constitute a recommendation for a particular land use. The extent of each listed map unit is shown in table 4. The location is shown on the detailed soil maps in the back of this publication. The soil qualities that affect use and management are described in the section "Detailed Soil Map Units."

Soils that have a high water table qualify for prime farmland if the water table is overcome by drainage. In table 5, the need for drainage is shown in parentheses after the map unit name. Onsite evaluation is necessary to see if the limitation has been overcome by corrective measures.

Use and Management of the Soils

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help avoid soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavior characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis in predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; as woodland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreation facilities; and for wildlife habitat. It can be used to identify the potentials and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in all or part of the survey area. The survey can help planners to maintain or create a land use pattern in harmony with the natural soil.

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where sandy layers, wetness, or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

Crops and Pasture

The system of land capability classification used by the Soil Conservation Service is explained in this section, and the estimated yields of the main crops and hay and pasture plants are listed for each soil.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under "Detailed Soil Map Units." Specific information can be obtained from the local office of the Soil Conservation Service or the Cooperative Extension Service.

Farms cover about 31 percent of this survey area, and the major crops are corn, soybeans, wheat, and barley. Most of the pasture is in a few small dairy and beef farms. Orchards, truck farms, nurseries, and hog farms make up a small part of the farm acreage.

Most of the soils in the county are subject to erosion by water and wind, and most need lime and fertilizer. Conservation tillage and the use of a winter cover crop are practices that help to control erosion.

Yields Per Acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 6. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations are also considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green-manure crops; and harvesting that insures the smallest possible loss.

The estimated yields reflect the productive capacity of each soil for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in table 6 are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Soil Conservation Service or of the Cooperative Extension Service can provide information about the management and productivity of the soils for those crops.

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The grouping does not take into account major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor does it consider possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for woodland or for engineering purposes.

In the capability system, soils are generally grouped at three levels: capability class, subclass, and unit. Only class and subclass are used in this survey. These levels are defined in the following paragraphs.

Capability classes, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class I soils have few limitations that restrict their use.

Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Class III soils have severe limitations that reduce the choice of plants or that require special conservation practices, or both.

Class IV soils have very severe limitations that reduce the choice of plants or that require very careful management, or both.

Class V soils are not likely to erode but have other limitations, impractical to remove, that limit their use.

Class VI soils have severe limitations that make them generally unsuitable for cultivation.

Class VII soils have very severe limitations that make them unsuitable for cultivation.

Class VIII soils and miscellaneous areas have limitations that nearly preclude their use for commercial crop production.

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *e, w, s,* or *c,* to the class numeral, for example, IIe. The letter *e* shows that the main limitation is risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow or droughty; and *c*, used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

In class I there are no subclasses because the soils of this class have few limitations. Class V contains only the subclasses indicated by *w, s,* or *c* because the soils in class V are subject to little or no erosion. They have other limitations that restrict their use to pasture, woodland, wildlife habitat, or recreation.

Capability units are soil groups within a subclass. The soils in a capability unit are enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity. Capability units are generally designated by adding an Arabic numeral to the subclass symbol, for example, IIe-4 or IIIe-6.

The capability classification of each map unit is given in the section "Detailed Soil Map Units."

Woodland Management and Productivity

Woodland covers about 63 percent of Middlesex County, and nearly all of it is second-growth hardwoods and pines. The dominant tree species are white oak, southern red oak, hickory, sweetgum, yellow-poplar, loblolly pine, and Virginia pine. Large timber companies own about 5 percent of the acreage, and they manage the woodland for mostly loblolly pine. The remainder of the woodland is held by smaller individual landowners.

Table 7 can be used by woodland owners or forest managers in planning the use of soils for wood crops. Only those soils suitable for wood crops are listed. The table lists the ordination (woodland suitability) symbol for each soil. Soils assigned the same ordination symbol require the same general management and have about the same potential productivity.

The first part of the *ordination symbol*, a number, indicates the potential productivity of the soils for important trees. The number 1 indicates very high productivity; 2, high; 3, moderately high; 4, moderate; and 5, low. The second part of the symbol, a letter, indicates the major kind of soil limitation. The letter *x* indicates stoniness or rockiness; *w*, excessive water in or on the soil; *t*, toxic substances in the soil; *d*, restricted root depth; *c*, clay in the upper part of the soil; *s*, sandy texture; *f*, high content of coarse fragments in the soil profile; and *r*, steep slopes. The letter *o* indicates that limitations or restrictions are insignificant. If a soil has more than one limitation, the priority is as follows: x, w, t, d, c, s, f, and r.

In table 7, *slight, moderate,* and *severe* indicate the degree of the major soil limitations to be considered in management.

Ratings of the *erosion hazard* indicate the risk of loss of soil in well managed woodland. The risk is *slight* if the expected soil loss is small, *moderate* if measures are needed to control erosion during logging and road construction, and *severe* if intensive management or special equipment and methods are needed to prevent excessive loss of soil.

Ratings of *equipment limitation* reflect the characteristics and conditions of the soil that restrict use of the equipment generally needed in woodland management or harvesting. A rating of *slight* indicates

that use of equipment is not limited to a particular kind of equipment or time of year; *moderate* indicates a short seasonal limitation or a need for some modification in management or in equipment; and *severe* indicates a seasonal limitation, a need for special equipment or management, or a hazard in the use of equipment.

Seedling mortality ratings indicate the degree to which the soil affects the mortality of tree seedlings. Plant competition is not considered in the ratings. The ratings apply to seedlings from good stock that are properly planted during a period of sufficient rainfall. A rating of *slight* indicates that the expected mortality is less than 25 percent; *moderate*, 25 to 50 percent; and *severe*, more than 50 percent.

Ratings of *windthrow hazard* are based on soil characteristics that affect the development of tree roots and the ability of the soil to hold trees firmly. A rating of *slight* indicates that few trees may be blown down by strong winds; *moderate*, that some trees will be blown down during periods of excessive soil wetness and strong winds; and *severe*, that many trees are blown down during periods of excessive soil wetness and moderate or strong winds.

The *potential productivity* of merchantable or *common trees* on a soil is expressed as a *site index*. This index is the average height, in feet, that dominant and codominant trees of a given species attain in a specified number of years. The site index applies to fully stocked, even-aged, unmanaged stands. Commonly grown trees are those that woodland managers generally favor in intermediate or improvement cuttings. They are selected on the basis of growth rate, quality, value, and marketability.

Trees to plant are those that are suited to the soils and to commercial wood production.

Recreation

The soils of the survey area are rated in table 8 according to limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewerlines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation are also important. Soils subject to flooding are limited for recreation use by the duration and intensity of flooding and the season when flooding occurs. In planning recreation facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In table 8, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties are generally favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.

The information in table 8 can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 11 and interpretations for dwellings without basements and for local roads and streets in table 10.

Camp areas require site preparation such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils have mild slopes and are not wet or subject to flooding during the period of use. The surface absorbs rainfall readily but remains firm and is not dusty when dry. Strong slopes can greatly increase the cost of constructing campsites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes that increase the cost of shaping sites or of building access roads and parking areas.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is firm after rains and is not dusty when dry.

Paths and trails for hiking and horseback riding should require little or no cutting and filling. The best soils are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once a year during the period of use. They have moderate slopes.

Golf fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. The best soils for use as golf fairways are firm when wet, are not dusty when dry, and are not subject to prolonged flooding during the period of use. They have moderate slopes. The suitability of the soil for tees or greens is not considered in rating the soils.

Wildlife Habitat

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. They also affect the construction of water impoundments. The kind and abundance of wildlife depend largely on the amount and distribution of food, cover, and water. Wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by promoting the natural establishment of desirable plants.

In table 9, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* indicates that the element or kind of habitat is easily established, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected. A rating of *fair* indicates that the element or kind of habitat can be established, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* indicates that limitations are severe for the designated element or kind of habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* indicates that restrictions for the element or kind of habitat are very severe and that unsatisfactory results can be expected. Creating, improving, or maintaining habitat is impractical or impossible.

The elements of wildlife habitat are described in the following paragraphs.

Grain and seed crops are domestic grains and seed-producing herbaceous plants. Soil properties and features that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of grain and seed crops are corn, wheat, sorghum, and soybeans.

Grasses and legumes are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flood hazard, and slope. Soil temperature and soil moisture are also considerations. Examples of grasses and legumes are tall fescue, coastal bermudagrass, blackwell switchgrass, and clovers.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of wild herbaceous plants are ragweed, goldenrod, foxtail millet, pokeberry, beggarweed, partridgepea, switchcane, and crabgrass.

Hardwood trees and woody understory produce nuts or other fruit, buds, catkins, twigs, bark, and foliage. Soil properties and features that affect the growth of hardwood trees and shrubs are depth of the root zone, the available water capacity, and wetness. Examples of these plants are oak, poplar, cherry, sweetgum, blackgum, apple, red maple, dogwood, hickory, holly, redbay, and blueberry. Examples of fruit-producing shrubs that are suitable for planting on soils rated *good* are cardinal autumn-olive and rem-red amur honeysuckle.

Coniferous plants furnish browse and seeds. Soil properties and features that affect the growth of coniferous trees, shrubs, and ground cover are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are pine, redcedar, and baldcypress.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, and slope. Examples of wetland plants are smartweed, wild millet, saltgrass, cordgrass, rushes, sedges, reeds, marsh elder, groundsel-tree, marsh hibiscus, and cattails.

Shallow water areas have an average depth of less than 5 feet. Some are naturally wet areas. Others are created by dams, levees, or other water-control structures. Soil properties and features affecting shallow water areas are depth to bedrock, wetness, slope, and permeability. Examples of shallow water areas are marshes, waterfowl feeding areas, and ponds.

The habitat for various kinds of wildlife is described in the following paragraphs.

Habitat for openland wildlife consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. The wildlife attracted to these areas include bobwhite quail, killdeer, meadowlark, mourning dove, field sparrow, and cottontail.

Habitat for woodland wildlife consists of areas of deciduous plants or coniferous plants or both and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include woodcock, thrushes, woodpeckers, squirrels, gray fox, raccoon, and deer.

Habitat for wetland wildlife consists of open, marshy or swampy shallow water areas. Some of the wildlife attracted to such areas are ducks, geese, herons, shore birds, muskrat, and mink.

Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. The ratings are given in the following tables: Building site development,

Sanitary facilities, Construction materials, and Water management. The ratings are based on observed performance of the soils and on the estimated data and test data in the "Soil Properties" section.

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil within a depth of 5 or 6 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations need to be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kind of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to (1) evaluate the potential of areas for residential, commercial, industrial, and recreation uses; (2) make preliminary estimates of construction conditions; (3) evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; (4) evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; (5) plan detailed onsite investigations of soils and geology; (6) locate potential sources of gravel, sand, earthfill, and topsoil; (7) plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and (8) predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the Glossary.

Building Site Development

Table 10 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by a cemented pan or a very firm dense layer; stone content; soil texture; and slope. The time of the year that excavations can be made is affected by the depth to a seasonal high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and the depth to the water table.

Dwellings and small commercial buildings are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements, for dwellings with basements, and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, shrink-swell potential, and organic layers can cause the movement of footings. A high water table, depth to bedrock, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 to 6 feet are not considered.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material, a base of gravel, crushed rock, or stabilized soil material, and a flexible or rigid surface. Cuts and fills are generally limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), shrink-swell potential, and depth to a high water table affect the traffic supporting capacity.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. The ratings are based on soil properties, site features, and observed performance of the soils. Soil reaction, a high water table, depth to bedrock, the available water capacity in the upper 40 inches, and the content of salts, sodium, and sulfidic materials affect plant growth. Flooding, wetness, slope, and the amount of sand, clay, or organic matter in the surface layer affect trafficability after vegetation is established.

Sanitary Facilities

Table 11 shows the degree and the kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

Table 11 also shows the suitability of the soils for use as daily cover for landfills. A rating of *good* indicates that soil properties and site features are favorable for the use and good performance and low maintenance can be expected; *fair* indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and *poor* indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 72 inches is evaluated. The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, a high water table, depth to bedrock, and flooding affect absorption of the effluent.

Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent, surfacing of effluent, and hillside seepage, can affect public health. Ground water can be polluted if highly permeable sand and gravel is less than 4 feet below the base of the absorption field, if slope is excessive, or if the water table is near the surface. There must be unsaturated soil material beneath the absorption field to filter the effluent effectively. Many local ordinances require that this material be of a certain thickness.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Lagoons generally are designed to hold the sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water.

Table 11 gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, a high water table, depth to bedrock, flooding, and content of organic matter.

Excessive seepage due to rapid permeability of the soil or a water table that is high enough to raise the level of sewage in the lagoon causes a lagoon to function unsatisfactorily. Pollution results if seepage is excessive or if floodwater overtops the lagoon. A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope, bedrock, and sandy layers can cause construction problems.

Sanitary landfills are areas where solid waste is disposed of by burying it in soil. There are two types of landfill—trench and area. In a trench landfill, the waste is placed in a trench. It is spread, compacted, and covered daily with a thin layer of soil excavated at the site. In an area landfill, the waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site.

Both types of landfill must be able to bear heavy vehicular traffic. Both types involve a risk of ground water pollution. Ease of excavation and revegetation needs to be considered.

The ratings in table 11 are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock or to a cemented pan, a high water table, slope, and flooding affect both types of landfill. Texture, highly organic layers, soil reaction, and content of salts and sodium affect trench type landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area type sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste.

Soil texture, wetness, coarse fragments, and slope affect the ease of removing and spreading the material during wet and dry periods. Loamy or silty soils that are free of excess gravel are the best cover for a landfill. Clayey soils are sticky or cloddy and are difficult to spread; sandy soils are subject to soil blowing.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock, or the water table to permit revegetation. The soil material used as final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

Construction Materials

Table 12 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good, fair,* or *poor* as a source of roadfill and topsoil. They are rated as a probable or improbable source of sand and gravel. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by a high water table and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and shrink-swell potential.

Soils rated *good* contain significant amounts of sand or gravel or both. They have at least 5 feet of suitable material, low shrink-swell potential, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated *fair* are more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have moderate shrink-swell potential or slopes of 15 to 25 percent. Depth to the water table is 1 to 3 feet. Soils rated *poor* have a plasticity index of more than 10, a high shrink-swell potential, many stones, or slopes of more than 25 percent. They are wet, and the depth to the water table is less than 1 foot. They may have layers of suitable material, but the material is less than 3 feet thick.

Sand and gravel are natural aggregates suitable for commercial use with a minimum of processing. Sand and gravel are used in many kinds of construction. Specifications for each use vary widely. In table 12, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the engineering classification of the soil) and the thickness of suitable material. Acidity and stratification are given in the soil series descriptions. Gradation of grain sizes is given in the table on engineering index properties.

A soil rated as a probable source has a layer of clean sand or gravel or a layer of sand or gravel that is up to 12 percent silty fines. This material must be at least 3 feet thick. All other soils are rated as an improbable source. Coarse fragments of soft bedrock, such as shale and siltstone, are not considered to be sand and gravel.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area.

Plant growth is affected by toxic material and by such properties as soil reaction, available water capacity, and fertility. The ease of excavating, loading, and spreading is affected by slope, a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, a water table, bedrock, and toxic material.

Soils rated *good* have friable loamy material to a depth of at least 40 inches. They have little or no gravel and have slopes of less than 8 percent. They are low in content of soluble salts, are naturally fertile or respond well to fertilizer, and are not so wet that excavation is difficult.

Soils rated *fair* are sandy soils, loamy soils that have a relatively high content of clay, soils that have only 20 to 40 inches of suitable material, soils that have an appreciable amount of gravel or soluble salts, or soils that have slopes of 8 to 15 percent. The soils are not so wet that excavation is difficult.

Soils rated *poor* are very sandy or clayey, have less than 20 inches of suitable material, have a large amount of gravel, or soluble salts, have slopes of more than 15 percent, or have a seasonal water table at or near the surface.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

Water Management

Table 13 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas; embankments, dikes, and levees; and aquifer-fed ponds. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

This table also gives for each soil the restrictive features that affect drainage, terraces and diversions, and grassed waterways.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of organic matter or salts. A high water table affects the amount of usable material. It also affects trafficability.

Aquifer-fed excavated ponds are pits or dugouts that extend to a ground-water aquifer or to a depth below a permanent water table. Excluded are ponds that are fed only by surface runoff and embankment ponds that impound water 3 feet or more above the original surface. Excavated ponds are affected by depth to a permanent water table, permeability of the aquifer, and quality of the water as inferred from the salinity of the soil.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to bedrock or to other layers that affect the rate of water movement; permeability; depth to a high water table or depth of standing water if the soil is subject to ponding; slope; susceptibility to flooding; and subsidence of organic layers. Excavating and grading and the stability of ditchbanks are affected mostly by depth to bedrock, slope, and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected mostly by extreme acidity or by toxic substances in the root zone, such as salts or sulfur. Availability of drainage outlets is not considered in the ratings.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to reduce erosion and conserve moisture by intercepting runoff. Slope and wetness mostly affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of wind or water erosion, an excessively coarse texture, and restricted permeability adversely affect maintenance.

Grassed waterways are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Wetness and slope mostly affect the construction of grassed waterways. A hazard of wind erosion, low available water capacity, restricted rooting depth, toxic substances such as salts and restricted permeability adversely affect the growth and maintenance of the grass after construction.

Soil Properties

Data relating to soil properties are collected during the course of the soil survey. The data and the estimates of soil and water features, listed in tables, are explained on the following pages.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help characterize key soils.

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classifications, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

Engineering Index Properties

Table 14 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under "Soil Series and Their Morphology."

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is as much as 15 percent, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the Glossary.

Classification of the soils is determined according to the Unified soil classification system (*2*) and the system adopted by the American Association of State Highway and Transportation Officials (*1*).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as Pt. Soils exhibiting engineering properties of two groups can have a dual classification, for example, SP-SM.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest.

Rock fragments larger than 3 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The

estimates are based on test data from the survey area or from nearby areas and on field examination.

The estimates of grain-size distribution, liquid limit, and plasticity index are rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points) across classification boundaries, the classification in the marginal zone is omitted in the table.

Physical and Chemical Properties

Table 15 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Clay as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In this table, the estimated clay content of each major soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The amount and kind of clay greatly affect the fertility and physical condition of the soil. They determine the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, and plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earth-moving operations.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at 1/3 bar moisture tension. Weight is determined after drying the soil at 105 degrees C. In this table, the estimated moist bulk density of each major soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. A bulk density of more than 1.6 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Permeability refers to the ability of a soil to transmit water or air. The estimates indicate the rate of downward movement of water when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems, septic tank absorption fields, and construction where the rate of water movement under saturated conditions affects behavior.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each major soil layer. The capacity varies, depending on soil properties that affect the retention of water and the depth of the root zone. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Soil reaction is a measure of acidity or alkalinity and is expressed as a range in pH values. The range in pH of each major horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Salinity is a measure of soluble salts in the soil at saturation. It is expressed as the electrical conductivity of the saturation extract, in millimhos per centimeter at 25 degrees C. Estimates are based on field and laboratory measurements at representative sites of nonirrigated soils. The salinity of irrigated soils is affected by the quality of the irrigation water and by the frequency of water application. Hence, the salinity of soils in individual fields can differ greatly from the value given in the table. Salinity affects the suitability of a soil for crop production, the stability of soil if used as construction material, and the potential of the soil to corrode metal and concrete.

Shrink-swell potential is the potential for volume change in a soil with a loss or gain in moisture. Volume change occurs mainly because of the interaction of clay minerals with water and varies with the amount and type of clay minerals in the soil. The size of the load on the soil and the magnitude of the change in soil moisture content influence the amount of swelling of soils in place. Laboratory measurements of swelling of undisturbed clods were made for many soils. For others, swelling was estimated on the basis of the kind and amount of clay minerals in the soil and on measurements of similar soils.

If the shrink-swell potential is rated moderate to very high, shrinking and swelling can cause damage to buildings, roads, and other structures. Special design is often needed.

Shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The change is based on the soil fraction less than 2 millimeters in diameter. The classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; and *high*, more than 6 percent. *Very high*, greater than 9 percent, is sometimes used.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average annual rate of soil loss by sheet

and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter (up to 4 percent) and on soil structure and permeability. Values of K range from 0.05 to 0.69. The higher the value the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

Organic matter is the plant and animal residue in the soil at various stages of decomposition.

In table 15, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter of a soil can be maintained or increased by returning crop residue to the soil. Organic matter affects the available water capacity, infiltration rate, and tilth. It is a source of nitrogen and other nutrients for crops.

Soil and Water Features

Table 16 gives estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils not protected by vegetation are assigned to one of four groups. They are grouped according to the intake of water when the soils are thoroughly wet and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Flooding, the temporary inundation of an area, is caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall or snowmelt is not considered flooding, nor is water in swamps and marshes.

Table 16 gives the frequency and duration of flooding and the time of year when flooding is most likely.

Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as none, rare, common, occasional, and frequent. *None* means that flooding is not probable; *rare* that it is unlikely but possible under unusual weather conditions; *common* that it is likely under normal conditions; *occasional* that it occurs, on the average, no more than once in 2 years; and *frequent* that it occurs, on the average, more than once in 2 years. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, and *long* if more than 7 days. Probable dates are expressed in months; November-May, for example, means that flooding can occur during the period November through May.

The information is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and absence of distinctive horizons that form in soils that are not subject to flooding.

Also considered are local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table (seasonal) is the highest level of a saturated zone in the soil in most years. The depth to a seasonal high water table applies to undrained soils. The estimates are based mainly on the evidence of a saturated zone, namely grayish colors or mottles in the soil. Indicated in table 16 are the depth to the seasonal high water table; the kind of water table—that is, perched or apparent; and the months of the year that the water table commonly is high. A water table that is seasonally high for less than 1 month is not indicated in table 16.

An *apparent* water table is a thick zone of free water in the soil. It is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil. A *perched* water table is water standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

Only saturated zones within a depth of about 6 feet are indicated. A plus sign preceding the range in depth indicates that the water table is above the surface of the soil. The first numeral in the range indicates how high the water rises above the surface. The second numeral indicates the depth below the surface.

Depth to bedrock is given if bedrock is within a depth of 5 feet. The depth is based on many soil borings and on observations during soil mapping. The rock is specified as either soft or hard. If the rock is soft or fractured, excavations can be made with trenching machines, backhoes, or small rippers. If the rock is hard or massive, blasting or special equipment generally is needed for excavation.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors creates a severe corrosion environment. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than steel in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low*, *moderate*, or *high*, is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion is also expressed as *low*, *moderate*, or *high*. It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (*4*). Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. Table 17 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Ten soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Ultisol.

SUBORDER. Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Udult (*Ud*, meaning humid, plus *ult*, from Ultisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Hapludults (*Hapl*, meaning minimal horizonation, plus *udult*, the suborder of the Ultisols that have a udic moisture regime).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that typifies the great group. An example is Typic Hapludults.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Mostly the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineral content, temperature regime, depth of the root zone, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is fine-loamy, siliceous, thermic Typic Hapludults.

SERIES. The series consists of soils that have similar horizons in their profile. The horizons are similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. The texture of the surface layer or of the substratum can differ within a series.

Soil Series and Their Morphology

In this section, each soil series recognized in the survey area is described. The descriptions are arranged in alphabetic order.

Characteristics of the soil and the material in which it formed are identified for each series. The soil is compared with similar soils and with nearby soils of other series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the Soil Survey Manual (*3*). Many of the technical terms used in the descriptions are defined in Soil Taxonomy (*4*). Unless otherwise stated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

The map units of each soil series are described in the section "Detailed Soil Map Units."

Ackwater Series

The soils of the Ackwater series are deep and moderately well drained. They formed in clayey fluvial and marine sediments. Ackwater soils are on river terraces. Slopes range from 0 to 2 percent.

Ackwater soils commonly are near Bethera, Craven, Emporia, Eunola, Myatt, Pocaty, Slagle, and Suffolk soils. The Ackwater soils have brighter colors throughout the profile than the Bethera, Myatt, or Pocaty soils; have more clay in the subsoil than the Emporia, Eunola, Slagle, or Suffolk soils; and have a thicker subsoil than the Craven soils.

Typical pedon of Ackwater silt loam, 1/2 mile southeast of VA-33 on VA-3, 1.82 miles southwest on a private dirt road, 2,100 feet west-southwest from the dirt road and approximately 450 feet from the Piankatank River:

A1—0 to 6 inches; yellowish brown (10YR 5/4) silt loam; weak medium granular structure; very friable; common fine and few medium roots; very strongly acid; clear smooth boundary.

B21t—6 to 15 inches; yellowish brown (10YR 5/8) clay loam; moderate fine subangular blocky structure; friable, slightly sticky, slightly plastic; few medium roots; few very fine pores; few thin clay films on faces of peds; very strongly acid; gradual smooth boundary.

B22t—15 to 23 inches; yellowish brown (10YR 5/8) clay loam; many medium prominent red (2.5YR 4/6) mottles and common fine faint light gray (10YR 7/2) mottles; moderate medium subangular blocky structure; friable, slightly sticky, slightly plastic; few fine and few medium roots; few very fine pores; common thin clay films on faces of peds; very strongly acid; gradual smooth boundary.

B23t—23 to 34 inches; yellowish brown (10YR 5/6) clay; common medium prominent red (2.5YR 4/6) mottles and few fine faint light gray (10YR 7/2) mottles; weak coarse prismatic structure parting to strong medium angular blocky; firm, sticky, plastic; few fine and medium roots; few very fine pores; many thick clay films on faces of peds; very strongly acid; clear smooth boundary.

B24t—34 to 44 inches; brownish yellow (10YR 6/8) clay; many medium distinct light gray (2.5Y 7/2) mottles; weak coarse prismatic structure parting to moderate medium angular blocky; firm, very sticky, very plastic; few fine and medium roots; few very fine pores; many thick clay films on faces of peds; very strongly acid; clear smooth boundary.

B3tg—44 to 60 inches; light gray (2.5Y 7/2) clay; common medium prominent yellowish brown (10YR 5/6) and strong brown (7.5YR 5/6) mottles; weak coarse prismatic structure parting to moderate medium subangular blocky; very firm, very sticky, very plastic; few very fine roots; common thick clay films on faces of peds; extremely acid.

The solum is more than 60 inches thick. The soil in unlimed areas ranges from extremely acid through strongly acid. Aluminum saturation on the exchange complex is more than 50 percent in some part of the solum.

The A horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 1 through 4. It mainly is fine sandy loam, loam, or silt loam. In eroded areas it is clay loam or silty clay loam.

The upper part of the B2t horizon has hue of 7.5YR through 2.5Y, value of 5 or 6, and chroma of 4 through 8. Low-chroma mottles are at a depth of less than 30 inches. The lower part of the B2t horizon and the B3 horizon are neutral or have hue of 10YR through 5Y, value of 5 through 7, and chroma of 0 through 8. The B2t and B3 horizons are clay loam, silty clay loam, silty clay, or clay.

Bama Series

The soils of the Bama series are deep and well drained. They formed in loamy fluvial and marine sediments. Bama soils are on upland ridges and side slopes. Slopes range from 2 to 6 percent.

Bama soils commonly are near Craven, Emporia, Kempsville, and Slagle soils. The Bama soils do not have the gray mottles typical of the Craven, Emporia, and Slagle soils and have a dominantly redder subsoil than the Kempsville soils.

Typical pedon of Bama loam, 2 to 6 percent slopes, 2,500 yards south of VA-604 and 2,500 yards north of Parrots Creek, at the north edge of field 300 feet west of an escarpment:

A1—0 to 4 inches; dark brown (10YR 3/3) loam; weak fine granular structure; very friable; common fine and medium roots; common fine pores; very strongly acid; abrupt smooth boundary.

B1—4 to 12 inches; brown (10YR 5/3) loam; weak fine granular structure; very friable; common medium roots; common fine pores; very strongly acid; clear smooth boundary.

B21t—12 to 21 inches; yellowish red (5YR 5/6) loam; many medium prominent pale brown (10YR 6/3) mottles; weak medium subangular blocky structure; friable; common fine roots; many medium pores; very strongly acid; clear smooth boundary.

B22t—21 to 32 inches; yellowish red (5YR 5/6) loam; many medium prominent pale brown (10YR 6/3) mottles; moderate coarse platy stucture parting to fine subangular blocky; friable; common fine roots; many medium pores; few thin clay films on faces of peds; few small pebbles; common krotovinas 1/4 to 3/4 inch in diameter; very strongly acid; gradual smooth boundary.

B23t—32 to 43 inches; red (2.5YR 5/6) clay loam; many medium prominent pale brown (10YR 6/3) mottles; weak medium subangular blocky structure; firm; few fine roots; few fine pores; many thin clay films on faces of peds; few small pebbles; very strongly acid; gradual smooth boundary.

B24t—43 to 60 inches; red (2.5YR 4/6) clay loam; common medium prominent pale brown (10YR 6/3) mottles; weak medium subangular blocky structure; firm, slightly sticky, slightly plastic; few fine roots; few fine pores; many thin clay films on faces of peds; few small pebbles; very strongly acid.

The thickness of the solum is more than 60 inches. The soil in unlimed areas is very strongly acid or strongly acid. Quartz gravel 2 to 10 millimeters in diameter makes up 0 to 5 percent of the soil.

The A1 or Ap horizon has hue of 10YR, value of 3 through 5, and chroma of 2 through 4. Some pedons have an A2 horizon that has hue of 10YR, value of 4 through 6, and chroma of 4 through 8. The A horizon is sandy loam or loam.

The B1 horizon has hue of 10YR, value of 4 or 5, and chroma of 3 through 6. It is fine sandy loam or loam.

The upper part of the B2t horizon has hue of 5YR, value of 4 or 5, and chroma of 6 or 8. The lower part of the B2t horizon has hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 6 or 8. Common to many pale brown mottles are throughout the B2t horizon. It is loam or clay loam.

Bethera Series

The soils of the Bethera series are deep and poorly drained. They formed in clayey fluvial and marine sediments. Bethera soils are on upland flats and depressions. Slopes range from 0 to 2 percent.

Bethera soils commonly are near Ackwater, Craven, Emporia, and Slagle soils and are in an undifferentiated unit with Daleville soils. The Bethera soils have more gray throughout the profile than the Ackwater, Craven, Emporia, or Slagle soils and have more clay in the subsoil than the Daleville soils.

Typical pedon of Bethera silt loam, in an area of Bethera and Daleville soils, 1/2 mile southwest on Woodstock Farm Road from VA-708 and 50 feet east of Woodstock Farm Road:

Ap—0 to 6 inches; dark grayish brown (10YR 4/2) silt loam; weak fine subangular blocky structure; friable; common fine and medium roots; extremely acid; clear smooth boundary.

B21tg—6 to 26 inches; gray (10YR 6/1) clay; common medium distinct brownish yellow (10YR 6/6) mottles and few medium prominent red (2.5YR 4/8) mottles; moderate medium subangular blocky structure; firm, sticky, plastic; few fine roots; common thin clay films on faces of peds; extremely acid; gradual smooth boundary.

B22tg—26 to 34 inches; gray (10YR 6/1) and strong brown (7.5YR 5/8) clay; strong fine and medium subangular blocky structure; firm, sticky, plastic; few fine roots; common thin clay films on faces of peds; very strongly acid; clear smooth boundary.

B23tg—34 to 50 inches; light gray (2.5Y 7/2) clay; common medium prominent reddish yellow (7.5YR 6/8) mottles; strong fine and medium subangular blocky structure; firm, sticky, plastic; few fine roots; few thin clay films on faces of peds; very strongly acid; gradual smooth boundary.

B24tg—50 to 60 inches; light gray (2.5Y 7/2) clay; many coarse prominent reddish yellow (7.5YR 6/8) mottles; moderate medium subangular blocky structure; firm, sticky, plastic; few thin clay films on faces of peds; extremely acid.

The thickness of the solum is more than 60 inches. The soil in unlimed areas ranges from extremely acid through strongly acid.

The Ap or A1 horizon has hue of 10YR or 2.5Y, value of 2 through 4, and chroma of 1 or 2. Some pedons have an A2 horizon that has hue of 10YR through 5Y, value of 4 through 7, and chroma of 1 or 2. The A horizon is fine sandy loam, loam, or silt loam.

The B2tg horizon is neutral or has hue of 10YR through 5Y, value of 4 through 7, and chroma of 0 through 2. Most pedons have common to many high-chroma mottles. The B2tg horizon is clay loam, silty clay loam, sandy clay, silty clay, or clay.

Bibb Series

The soils of the Bibb series are deep and poorly drained. They formed in stratified loamy and sandy alluvial sediments. Bibb soils are on narrow flood plains. Slopes range from 0 to 2 percent.

Bibb soils commonly are near Craven, Emporia, Kenansville, Ochlockonee, Pocaty, and Suffolk soils and are in a complex with Kinston soils. Bibb soils have more gray throughout than the Craven, Emporia, Kenansville, Ochlockonee, or Suffolk soils; have less clay in the substratum than the Kinston soils; and do not have the thick organic layers typical of the Pocaty soils.

Typical pedon of Bibb sandy loam, in an area of Kinston-Bibb complex, 300 feet north on US-17 from the main channel of Dragon Run and 100 feet east of US-17:

A1—0 to 10 inches; dark grayish brown (10YR 4/2) sandy loam; many medium distinct yellowish brown (10YR 5/4) mottles; weak fine granular structure; very friable; many coarse and medium roots; strongly acid; abrupt smooth boundary.

C1g—10 to 28 inches; gray (10YR 5/1) sandy loam; many medium distinct brown (10YR 4/3) mottles; massive; very friable, slightly sticky, slightly plastic; few fine roots; strongly acid; clear smooth boundary.

C2g—28 to 32 inches; gray (10YR 6/1) fine sandy loam; massive; very friable, slightly sticky, slightly plastic; strongly acid; clear smooth boundary.

C3g—32 to 40 inches; light gray (10YR 7/2) loamy sand; common medium distinct light yellowish brown (10YR 6/4) mottles; massive; very friable, nonsticky, nonplastic; strongly acid; clear smooth boundary.

C4g—40 to 60 inches; gray (2.5Y 6/1) sand; single grain; loose; strongly acid.

The soil is very strongly acid or strongly acid. A few flakes of mica and small pebbles are in some pedons.

The A horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 1 through 4. In some pedons it does not have mottles. It is loamy sand, sandy loam, or loam.

The C horizon is neutral or has hue of 10YR through 5Y, value of 4 through 7, and chroma of 0 through 2. Mottled subhorizons have few to many red, yellow, or brown mottles. The Cg horizon is stratified sand, loamy sand, sandy loam, fine sandy loam, or loam. Some strata have a high content of gravel.

Catpoint Series

The soils of the Catpoint series are deep and somewhat excessively drained. They formed in sandy marine or fluvial deposits. Catpoint soils are mainly on low terraces along drainageways. Slopes range from 0 to 4 percent.

Catpoint soils commonly are near Kenansville, Nansemond, Ochlockonee, Pactolus, Rumford, and Suffolk soils. Catpoint soils have more sand than the Kenansville, Nansemond, Ochlockonee, Rumford, or Suffolk soils and do not have the gray mottles in the upper 40 inches typical of the Pactolus soils.

Typical pedon of Catpoint loamy sand, near the south end of VA-644, east of Megg's Bay and 300 yards north of the Piankatank River, in a pine stand:

A1—0 to 11 inches; dark brown (10YR 4/3) loamy sand; weak fine granular structure; very friable; few coarse and common fine and medium roots; strongly acid; clear smooth boundary.

B21—11 to 17 inches; yellowish brown (10YR 5/4) loamy sand; single grain; loose; few coarse and common fine and medium roots; strongly acid; clear smooth boundary.

B22—17 to 29 inches; yellowish brown (10YR 5/6) loamy sand; single grain; loose; few coarse and common fine and medium roots; strongly acid; gradual smooth boundary.

A21&Bt—29 to 43 inches; brownish yellow (10YR 6/6) loamy sand (A21); single grain; loose; few fine and medium roots; few strong brown (7.5YR 5/6) sandy loam lamellae (Bt); massive; very friable; lamellae are discontinuous, 1/4 to 3/4 inch thick, and total 3 inches thick; strongly acid; gradual smooth boundary.

A22&Bt—43 to 57 inches; brownish yellow (10YR 6/6) sand (A22); few medium distinct pale brown (10YR 6/3) and light gray (10YR 7/1) mottles; single grain; loose; few fine and medium roots; few strong brown (7.5YR 5/6) sandy loam lamellae (Bt); massive; very friable; lamellae are discontinuous, 1/4 to 3/4 inch thick, and total 2 inches thick; strongly acid; gradual smooth boundary.

C—57 to 72 inches; light yellowish brown (10YR 6/4) sand; few medium distinct pale brown (10YR 6/3) and light gray (10YR 7/1) mottles; single grain; loose; few fine and medium roots; moderately acid.

The thickness of sandy material is more than 80 inches. The soil in unlimed areas is very strongly acid through slightly acid. Lamellae are at a depth of less than 60 inches and have a combined thickness of less than 6 inches.

The A1 or Ap horizon has hue of 7.5YR or 10YR, value of 3 through 5, and chroma of 2 through 4. Where value is 3 and chroma is 2, the horizon is less than 10 inches thick. It is sand, fine sand, or loamy sand.

The B2 horizon has hue of 7.5YR or 10YR, value of 4 through 6, and chroma of 4 through 8. It is sand or loamy sand.

The A2 horizon has hue of 10YR, value of 4 through 6, and chroma of 2 through 6. It is sand or loamy sand.

The Bt horizon (lamellae) has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 through 8. It is sandy loam, fine sandy loam, or loamy sand. Lamellae commonly are 1/16 to 3/4 inch thick and are discontinuous.

The C horizon has hue of 10YR through 5Y, value of 5 through 8, and chroma of 1 through 4. It is sand or loamy sand.

Craven Series

The soils of the Craven series are deep and moderately well drained. They formed in clayey marine sediments. Craven soils are mainly on ridges and side slopes. Slopes range from 0 to 6 percent.

Craven soils commonly are near Ackwater, Bethera, Daleville, Emporia, Eunola, Myatt, and Slagle soils. Craven soils have a thinner subsoil than the Ackwater soils; do not have as much gray in the profile as the Bethera, Daleville, or Myatt soils; and have more clay in the upper part of the subsoil than the Emporia, Eunola, or Slagle soils.

Typical pedon of Craven silt loam, 0 to 2 percent slopes, 0.63 mile from VA-633 on VA-632, 1,050 feet south of VA-632 and 25 feet from the southeast corner of the field:

Ap—0 to 2 inches; mixed grayish brown (10YR 5/2) and dark grayish brown (10YR 4/2) silt loam; weak medium granular structure; friable, slightly sticky, slightly plastic; common fine roots; moderately acid; abrupt smooth boundary.

B1t—2 to 10 inches; mixed light yellowish brown (10YR 6/4), brown (10YR 5/3), and very pale brown (10YR 7/3) silty clay loam; weak fine subangular blocky structure; firm, slightly sticky, slightly plastic; common fine roots along faces of peds; few thin patchy clay films on faces of peds; moderately acid; clear smooth boundary.

B21t—10 to 16 inches; light yellowish brown (10YR 6/4) clay; moderate medium subangular blocky structure; firm, sticky, plastic; few fine roots along faces of peds; common thin clay films on faces of peds; strongly acid; clear smooth boundary.

B22t—16 to 22 inches; yellowish brown (10YR 5/4) clay; medium distinct brownish yellow (10YR 6/6) mottles and common fine prominent gray (10YR 5/1) mottles; moderate medium subangular blocky structure; firm, sticky, plastic; few fine roots along faces of peds; common thin clay films on faces of peds; very strongly acid; clear smooth boundary.

B23t—22 to 28 inches; mottled yellowish brown (10YR 5/4) and gray (10YR 5/1) clay; moderate medium subangular blocky structure; firm, sticky, plastic; few fine roots along faces of peds; common thin clay films on faces of peds; very strongly acid; clear smooth boundary.

B31tg—28 to 40 inches; mottled light gray (10YR 7/1), brownish yellow (10YR 6/6), and strong brown (7.5YR 5/6) sandy clay loam; weak coarse platy structure parting to moderate fine subangular blocky; very firm, sticky, plastic; many thin clay films on plates and on faces of peds; very strongly acid; clear wavy boundary.

B32tg—40 to 45 inches; mottled light gray (10YR 7/1), brown (10YR 5/3), and strong brown (7.5YR 5/8) sandy clay loam; moderate medium subangular blocky structure; firm, slightly sticky, slightly plastic; common thin clay films on faces of peds; common pockets and lenses of clay; extremely acid; clear smooth boundary.

C1—45 to 56 inches; mottled light gray (10YR 7/1), brown (10YR 4/3), and brownish yellow (10YR 6/8) sandy loam; massive; friable, slightly sticky, slightly plastic; few clay flows; common pockets and lenses of clay; extremely acid; clear smooth boundary.

C2—56 to 66 inches; yellowish brown (10YR 5/6) sandy loam; few medium distinct gray (10YR 6/1) mottles; massive; very friable; very strongly acid.

The thickness of the solum ranges from 40 to 60 inches. The soil in unlimed areas ranges from extremely acid through strongly acid. Coarse fragments make up 0 to 2 percent of the soil.

The A1 or Ap horizon has hue of 10YR or 2.5Y, value of 4 through 6, and chroma of 2 or 3. It is fine sandy loam, loam, or silt loam.

The B1 horizon has hue of 10YR or 2.5Y, value of 5 through 7, and chroma of 3 through 8. It is silty clay loam or loam.

The upper part of the B2t horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 4 through 8. It is clay loam or clay. The lower part of the B2t horizon has hue of 10YR or 2.5Y, value of 5 through 7, and chroma of 1 or 2, or it is mottled with many colors. It is clay loam or clay.

The B3 horizon has hue of 10YR or 2.5Y, value of 5 through 7, and chroma of 1 or 2, or it is mottled with many colors. It is sandy clay loam or sandy clay.

The C horizon has hue of 10YR or 2.5Y, value of 5 through 7, and chroma of 1 through 6, or it is mottled. It is sandy loam, sandy clay loam, or loamy sand.

The Craven soils in this survey area are a taxadjunct to the Craven series because they have a thinner Bt horizon and more sand in the lower part of the Bt horizon than is defined in the range for the series. These differences do not significantly affect the use and management of the soils.

Daleville Series

The soils of the Daleville series are deep and poorly drained. They formed in loamy fluvial and marine sediments. Daleville soils are on upland flats and in slight depressions. Slopes range from 0 to 2 percent.

Daleville soils commonly are near Ackwater, Craven, Emporia, and Slagle soils and are in an undifferentiated group with Bethera soils. The Daleville soils are grayer throughout than the Ackwater, Craven, Emporia, or Slagle soils and have less clay in the subsoil than the Bethera soils.

Typical pedon of Daleville loam, in an area of Bethera and Daleville soils, 1 mile west of Churchview on VA-602 and 750 feet north of VA-602:

Ap—0 to 9 inches; grayish brown (2.5Y 5/2) loam; weak medium granular structure; friable; many fine and medium roots; very strongly acid; clear smooth boundary.

B21tg—9 to 22 inches; gray (10YR 5/1) clay loam; many coarse prominent yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; friable; many fine roots; few patchy clay films on faces of peds; very strongly acid; gradual wavy boundary.

B22tg—22 to 30 inches; gray (10YR 5/1) clay loam; few medium prominent strong brown (7.5YR 5/6) mottles and many coarse prominent yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; friable; few patchy clay films on faces of peds; very strongly acid; gradual wavy boundary.

B23tg—30 to 37 inches; gray (10YR 5/1) clay loam; common medium prominent strong brown (7.5YR 5/8) mottles; moderate medium subangular blocky structure; firm; few patchy clay films on faces of peds; very strongly acid; gradual smooth boundary.

B24tg—37 to 47 inches; gray (10YR 5/1) clay loam; moderate medium subangular blocky structure; firm; few patchy clay films on faces of peds; common pockets and lenses of clay; very strongly acid; gradual smooth boundary.

B3g—47 to 60 inches; gray (10YR 5/1) clay loam; common medium prominent yellowish brown (10YR 5/6) and strong brown (7.5YR 5/6) mottles; weak coarse subangular blocky structure; firm; common pockets and lenses of friable sandy clay loam; very strongly acid.

The thickness of the solum is more than 60 inches. The soil in unlimed areas is very strongly acid or strongly acid.

The Ap horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 1 or 2. Some pedons have an A2 horizon that has hue of 10YR or 2.5Y, value of 5 through 7, and chroma of 1 or 2. The A horizon is fine sandy loam, loam, or silt loam.

The B horizon is neutral or has hue of 10YR or 2.5Y, value of 4 through 7, and chroma of 0 through 2. Mottles in shades of red, brown, or yellow range from few to many. The B horizon is loam, sandy clay loam, or clay loam. The upper 20 inches of the B horizon has a weighted average of 20 to 35 percent clay and more than 30 percent silt.

Emporia Series

The soils of the Emporia series are deep and well drained. They formed in stratified loamy fluvial and marine sediments. Emporia soils are on terraces and on side slopes adjacent to major drainageways. Slopes range from 0 to 45 percent.

Emporia soils commonly are near Bama, Craven, Eunola, Kempsvile, Remlik, Slagle, and Suffolk soils and are in a complex with Nevarc soils. Emporia soils have gray mottles in the lower part of the solum; Bama, Kempsville, and Suffolk soils do not have mottles, and the Craven, Eunola, Nevarc, and Slagle soils have gray mottles in the upper part of the subsoil. The Emporia soils have more clay in the subsoil than the Remlik soils.

Typical pedon of Emporia loam, 2 to 6 percent slopes, 45 feet north of US-33 at a point where US-33 is about 600 feet east of Shortcut Road:

A1—0 to 8 inches; dark grayish brown (10YR 4/2) loam; weak fine and medium granular structure; very friable; common fine and medium and few coarse roots; strongly acid; abrupt smooth boundary.

A2—8 to 14 inches; brown (10YR 5/3) loam; weak medium granular structure; very friable, slightly sticky, slightly plastic; common fine and few medium roots; strongly acid; clear smooth boundary.

B1t—14 to 19 inches; yellowish brown (10YR 5/4) loam; weak fine subangular blocky structure; friable, slightly sticky, slightly plastic; common fine and few medium roots; few patchy clay films on faces of peds; very strongly acid; clear smooth boundary.

B21t—19 to 31 inches; yellowish brown (10YR 5/6) clay loam; weak medium subangular blocky structure; friable, slightly sticky, slightly plastic; few fine medium and coarse roots; common thin clay films on faces of peds; very strongly acid; clear smooth boundary.

B22t—31 to 39 inches; yellowish brown (10YR 5/6) loam; many distinct pale brown (10YR 6/3) and very pale brown (10YR 7/4) mottles; moderate medium subangular blocky structure; friable, slightly sticky, slightly plastic, few fine and medium roots; common thin clay films on faces of peds; strongly acid; wavy smooth boundary.

B23t—39 to 49 inches; yellowish brown (10YR 5/6) clay loam; many pale brown (10YR 6/3) and red (2.5YR 4/6) mottles; moderate medium platy structure; firm, slightly sticky, slightly plastic; few fine roots; common thin clay films on faces of peds; strongly acid; clear smooth boundary.

B24t—49 to 59 inches; mottled yellowish brown (10YR 5/6), pale brown (10YR 6/3), light gray (10YR 7/2), and red (2.5YR 4/6) sandy clay loam; moderate medium platy structure; friable, slightly sticky, slightly plastic; few fine roots; common patchy clay films on faces of peds; very strongly acid; clear smooth boundary.

C—59 to 66 inches; yellowish red (5YR 4/6) sandy clay loam; common medium prominent light gray (10YR 7/2), light yellowish brown (10YR 6/4), and yellowish brown (10YR 5/6) mottles; massive; friable, nonsticky, nonplastic; very strongly acid.

The thickness of the solum ranges from 40 to 75 inches. The soil in unlimed areas is very strongly acid or strongly acid.

The A1 or Ap horizon has hue of 10YR or 2.5Y, value of 4 through 6, and chroma of 2 through 4. The A2 horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 3 or 4. The A horizon is sandy loam, fine sandy loam, or loam.

The B1 horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 4 through 6. It is sandy loam, fine sandy loam, or loam.

The upper part of the B2t horizon has hue of 5YR through 10YR, value of 4 through 6, and chroma of 3 through 8. Some pedons have high-chroma mottles. The lower part of the B2t horizon is neutral or has hue of 5YR through 2.5Y, value of 4 through 6, and chroma of 0 through 8, or it is mottled without a dominant matrix. The B2t horizon mainly is sandy loam, fine sandy loam, sandy clay loam, loam, or clay loam. The lower part of the B2t horizon ranges to sandy clay or clay.

The C horizon has hue of 5YR through 2.5Y or is neutral, has value of 3 through 8, and has chroma of 0 through 8. It ranges from sandy loam to clay.

Eunola Series

The soils of the Eunola series are deep and moderately well drained. They formed in loamy fluvial or

marine sediments. Eunola soils are on uplands. Slopes range from 0 to 2 percent.

Eunola soils commonly are near Craven, Emporia, Kempsville, Kenansville, Myatt, Nansemond, Pactolus, and Suffolk soils. The Eunola soils have less clay in the subsoil than the Craven soils and more clay in the subsoil than the Nansemond or Pactolus soils. The Eunola soils have gray mottles in the upper part of the solum; the Emporia, Kempsville, Kenansville, and Suffolk soils do not. The Eunola soils do not have the gray matrix colors typical of the Myatt soils.

Typical pedon of Eunola loam, 1/2 mile north of Wilton on VA-628, in cultivated field 400 feet east of a dirt road, 125 feet north of old fence line:

Ap—0 to 9 inches; brown (10YR 4/3) loam; moderate medium granular structure; very friable; common fine roots; common fine tubular pores; moderately acid; abrupt smooth boundary.

B21t—9 to 16 inches; yellowish brown (10YR 5/4) loam; weak medium subangular blocky structure; friable; common fine roots; common fine tubular pores; strongly acid; gradual smooth boundary.

B22t—16 to 24 inches; yellowish brown (10YR 5/4) clay loam; common medium faint yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; friable, slightly sticky, plastic; common thin patchy clay films on faces of peds; common fine tubular pores; very strongly acid; gradual smooth boundary.

B23t—24 to 28 inches; light olive brown (2.5Y 5/4) sandy clay loam; common medium distinct yellowish brown (10YR 5/6) mottles and few fine distinct dark grayish brown (10YR 4/2) mottles; weak medium subangular blocky structure; friable; few fine roots; few thin patchy clay films on faces of peds; common fine tubular pores; very strongly acid; clear smooth boundary.

B3—28 to 41 inches; light olive brown (2.5Y 5/4) sandy loam; common medium distinct dark grayish brown (10YR 4/2) mottles and common medium prominent reddish yellow (7.5YR 6/6) mottles; weak medium subangular blocky structure; friable; few fine roots; many fine tubular pores; very strongly acid; clear smooth boundary.

C1—41 to 46 inches; light yellowish brown (10YR 6/4) loamy sand; common medium distinct light gray (10YR 7/2) mottles; massive; friable; very strongly acid; abrupt smooth boundary.

C2—46 to 52 inches; strong brown (7.5YR 5/6) sand; common medium distinct yellowish brown (10YR 5/4) mottles; single grain; loose; very strongly acid; abrupt smooth boundary.

C3—52 to 60 inches; very pale brown (10YR 7/4) sand; streaks of yellowish brown (10YR 5/6) and light gray (10YR 7/2); single grain; loose; very strongly acid.

The thickness of the solum ranges from 40 to 60 inches. The soil in unlimed areas is very strongly acid or strongly acid.

The A1 or Ap horizon has hue of 10YR, value of 3 or 4, and chroma of 1 through 3. Some pedons have an A2 horizon that has hue of 10YR, value of 4 through 6, and chroma of 3 or 4. The A horizon is sandy loam, fine sandy loam, or loam.

Some pedons have a B1 horizon that has hue of 7.5YR or 10YR, value of 5, and chroma of 4 through 6. It is sandy loam, fine sandy loam, or loam.

The upper part of the B2t horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 4 through 6. The lower part of the B2t horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 3 through 6, or it is mottled without a dominant matrix. The B2t horizon is fine sandy loam, sandy clay loam, clay loam, or loam.

The B3 horizon has hue, value, and chroma similar to those of the lower part of the B2t horizon. The B3 horizon is sandy loam or fine sandy loam.

The C horizon has hue of 7.5YR through 2.5Y, value of 5 through 7, and chroma of 1 through 8, or it is mottled. It is sand, loamy sand, or sandy loam.

The Eunola soils in this survey area are a taxadjunct to the Eunola series because they have more silt in the upper part of the subsoil than is defined in the range for the series. This difference does not significantly affect the use and management of the soils.

Kempsville Series

The soils of the Kempsville series are deep and well drained. They formed in loamy fluvial and marine sediments. Kempsville soils are on uplands. Slopes range from 0 to 6 percent.

Kempsville soils commonly are near Bama, Craven, Emporia, Remlik, Slagle, and Suffolk soils. The Kempsville soils are browner in the subsoil than the Bama soils, have less clay in the subsoil than the Craven soils, do not have gray mottles as do the Emporia and Slagle soils, and have a thicker subsoil than the Remlik or Suffolk soils.

Typical pedon of Kempsville sandy loam, 2 to 6 percent slopes, 1 mile north on VA-618 from the intersection of US-17 and VA-33:

Ap—0 to 6 inches; brown (10YR 4/3) sandy loam; weak fine granular structure; very friable; common fine and medium roots; common fine tubular pores; strongly acid; abrupt smooth boundary.

B21t—6 to 17 inches; strong brown (7.5YR 5/6) sandy clay loam; weak medium subangular blocky structure; friable, slightly sticky, slightly plastic; few fine and medium roots; few fine tubular pores; thin patchy clay films on faces of peds; very strongly acid; clear wavy boundary.

B22t—17 to 31 inches; strong brown (7.5YR 5/6) sandy clay loam; moderate medium subangular blocky structure; friable, slightly sticky, slightly plastic; few fine roots; few fine tubular pores; thin patchy clay films on faces of peds; very strongly acid; clear smooth boundary.

B23t—31 to 51 inches; strong brown (7.5YR 5/6) sandy loam; common medium faint very pale brown (10YR 7/3) mottles; weak medium subangular blocky structure; firm in place; many fine discontinuous pores; thin patchy clay films on faces of peds; very strongly acid; clear smooth boundary.

B24t—51 to 62 inches; yellowish red (5YR 5/6) sandy clay loam; common medium faint very pale brown (10YR 7/3) mottles; weak medium subangular blocky structure; 20 percent compact and slightly brittle; many fine discontinuous pores; thin patchy clay films on faces of peds; very strongly acid.

The thickness of the solum ranges from 50 to 85 inches. The soil in unlimed areas is very strongly acid or strongly acid. Rounded quartz gravel makes up 0 to 5 percent of the A and B horizons and 0 to 20 percent of the C horizon.

The A1 or Ap horizon has hue of 10YR, value of 3 through 5, and chroma of 2 through 4. Some pedons have an A2 horizon that has value of 5 or 6 and chroma of 3 through 6. The A horizon is fine sandy loam or sandy loam.

The upper part of the B2t horizon has hue of 7.5YR or 10YR, value of 4 through 6, and chroma of 4 through 8. The lower part of the B2t horizon has hue of 5YR through 10YR, value of 4 through 6, and chroma of 4 through 8. Most pedons have a subhorizon of the B2t that is brittle and compact in up to 40 percent of the subhorizons. The B2t horizon is sandy loam, sandy clay loam, or loam.

The C horizon has hue of 2.5YR through 10YR, value of 5 or 6, and chroma of 4 through 8. High-chroma mottles are common in most pedons. The C horizon is sandy loam, sandy clay loam, or loamy sand in the fine-earth fraction.

Kenansville Series

The soils of the Kenansville series are deep and well drained. They formed in Coastal Plain and stream terrace sediments and are on Coastal Plain uplands and stream terraces. Slopes range from 0 to 4 percent.

Kenansville soils commonly are near Catpoint, Eunola, Kempsville, Nansemond, Pactolus, Rumford, and Suffolk soils. Kenansville soils have more clay in the subsoil than the Catpoint or Pactolus soils and have a thicker surface layer than the Eunola, Kempsville, Nansemond, Rumford, or Suffolk soils.

Typical pedon of Kenansville fine sand, 1½ miles southwest of the junction of VA-3 and VA-630:

Ap—0 to 14 inches; dark grayish brown (10YR 4/2) fine sand; weak fine granular structure; very friable; common fine roots; strongly acid; clear smooth boundary.

A2—14 to 26 inches; light yellowish brown (10YR 6/4) and yellowish brown (10YR 5/6) loamy fine sand; weak fine granular structure; very friable; common fine roots; strongly acid; gradual smooth boundary.

B21t—26 to 32 inches; light yellowish brown (10YR 6/4) fine sandy loam; weak fine granular structure; very friable; few fine roots; common strong brown (7.5YR 5/6) soft nodules 1/4 inch to 1 inch in diameter; sand grains coated and bridged with clay; strongly acid; clear smooth boundary.

B22t—32 to 42 inches; brown (7.5YR 4/4) fine sandy loam; weak fine subangular blocky structure; very friable; sand grains coated and bridged with clay; strongly acid; clear smooth boundary.

B23t—42 to 48 inches; strong brown (7.5YR 5/6) fine sandy loam; weak medium granular structure; very friable; sand grains coated and bridged with clay; very strongly acid; clear smooth boundary.

C—48 to 60 inches; brownish yellow (10YR 6/6) fine sand; many medium distinct reddish brown (5YR 5/4) mottles; single grain; loose; many strong brown (7.5YR 5/6) soft nodules ¼ to 1¼ inches in diameter; very strongly acid.

The thickness of the solum ranges from 40 to 55 inches. The soil in unlimed areas is very strongly acid or strongly acid.

The A1 or Ap horizon has hue of 10YR, value of 4 through 6, and chroma of 2 or 3. The A2 horizon has hue of 10YR, value of 5 or 6, and chroma of 3 through 6. The A horizon is fine sand, loamy sand, or loamy fine sand.

The B2t horizon has hue of 7.5YR or 10YR, value of 4 through 6, and chroma of 4 through 8. It is sandy loam, fine sandy loam, or sandy clay loam.

The C horizon has hue of 10YR, value of 5 through 7, and chroma of 3 through 8. It is loamy sand, fine sand, or sand.

Kinston Series

The soils of the Kinston series are deep and poorly drained. They formed in stratified loamy and sandy sediments eroded from Coastal Plain uplands. Kinston soils are on narrow freshwater flood plains. Slope ranges from 0 to 2 percent.

Kinston soils are in a complex with Bibb soils and are commonly near Craven, Emporia, Kenansville, Ochlockonee, Pocaty, and Suffolk soils. The Kinston soils have more clay in the subsoil than the Bibb soils; are grayer throughout than the Craven, Emporia, Kenansville, Ochlockonee, or Suffok soils; and do not

have the organic layers that are characteristic of the Pocaty soils.

Typical pedon of Kinston loam, in an area of Kinston-Bibb complex, 300 feet north of a bridge on US-17 at Dragon Run and 200 feet east of US-17:

A1—0 to 10 inches; brown (10YR 5/3) loam; many medium distinct light olive brown (2.5Y 5/6) mottles; weak medium granular structure; friable; many fine medium and large roots; strongly acid; clear smooth boundary.

C1g—10 to 30 inches; dark grayish brown (10YR 4/2) clay loam; few medium faint light olive brown (2.5Y 5/6) and dark yellowish brown (10YR 4/4) mottles; weak medium subangular blocky structure; friable; few fine roots; strongly acid; clear smooth boundary.

C2g—30 to 50 inches; gray (10YR 6/1) sandy clay loam; common medium distinct yellowish red (5YR 4/6) mottles; weak medium subangular blocky structure; friable; strongly acid; gradual smooth boundary.

C3g—50 to 60 inches; dark gray sandy loam; massive; friable; strongly acid.

The thickness of loamy sediments ranges from 40 to 60 inches or more over stratified sandy material. The soil is very strongly acid or strongly acid.

The A horizon has hue of 10YR, value of 4 or 5, and chroma of 1 through 3. It is fine sandy loam, loam, or silt loam.

The C horizon is neutral or has hue of 10YR or 2.5Y, value of 4 through 7, and chroma of 0 through 2. It is sandy loam, clay loam, sandy clay loam, or loam.

Lumbee Series

The soils of the Lumbee series are deep and poorly drained. They formed in loamy fluvial deposits. Lumbee soils are on broad, low-lying terraces. Slopes range from 0 to 2 percent.

Lumbee soils commonly are near Eunola, Myatt, Nansemond, Suffolk, and Pocaty soils. The Lumbee soils are grayer throughout than the Eunola, Nansemond, or Suffolk soils; have a thinner subsoil than the Myatt soils; and do not have the organic layers characteristic of the Pocaty soils.

Typical pedon of Lumbee silt loam, 400 feet southeast of the junction of US-33 and VA-654, at Stingray Point:

A1—0 to 4 inches; gray (10YR 5/1) silt loam; weak fine granular structure; very friable; many fine and medium roots and common coarse roots; many fine and medium pores; strongly acid; abrupt smooth boundary.

A2—4 to 7 inches; light brownish gray (2.5Y 6/2) silt loam; common medium distinct brownish yellow (10YR 6/6) mottles; moderate fine subangular blocky structure; very friable; common fine and medium roots; many fine pores; very strongly acid; abrupt smooth boundary.

B21tg—7 to 16 inches; grayish brown (2.5Y 5/2) silt loam; common medium distinct brownish yellow (10YR 6/6) mottles and few fine distinct yellowish brown (10YR 5/8) mottles; moderate fine subangular blocky structure; friable; common fine and few medium roots; many fine pores; few thin patchy clay films on faces of peds; very strongly acid; clear smooth boundary.

B22tg—16 to 22 inches; gray (10YR 6/1) loam; common medium distinct yellowish brown (10YR 5/6) mottles and few fine prominent strong brown (7.5YR 5/6) mottles; moderate fine subangular blocky structure; friable; common fine roots; many fine pores; few thin patchy clay films on faces of peds; strongly acid; clear smooth boundary.

B3g—22 to 27 inches; gray (10YR 6/1) sandy loam; common medium distinct yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; very friable; common fine roots; common fine pores; strongly acid; clear smooth boundary.

IIC1g—27 to 38 inches; gray (10YR 6/1) sand; common coarse faint pale brown (10YR 6/3) mottles; single grain; loose; few fine roots; very strongly acid; clear smooth boundary.

IIC2g—38 to 44 inches; gray (10YR 6/1) and light gray (10YR 7/1) sand; common medium faint very pale brown (10YR 7/4) mottles and few fine distinct brownish yellow (10YR 6/6) mottles; single grain; loose; very strongly acid; clear smooth boundary.

IIC3—44 to 51 inches; mottled light brownish gray (2.5Y 6/2), light gray (10YR 7/2), and brownish yellow (10YR 6/8) sand; single grain; loose; very strongly acid; clear smooth boundary.

IIC4—51 to 60 inches; brownish yellow (10YR 6/8) sand; common medium distinct strong brown (7.5YR 5/8) and light gray (10YR 7/1) mottles; single grain; loose; very strongly acid.

The thickness of the solum ranges from 20 to 40 inches and corresponds to the depth to the contrasting sandy material. The soil in unlimed areas is very strongly acid or strongly acid.

The A1 or Ap horizon has hue of 10YR or 2.5Y, value of 3 through 5, and chroma of 1 or 2. The A2 horizon has hue of 10YR or 2.5Y, value of 5 through 7, and chroma of 1 or 2. The A horizon is sandy loam, fine sandy loam, loam, or silt loam.

The B2t and B3 horizons have hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 1 or 2. The B2t horizon is loam, silt loam, sandy clay loam, or clay loam. The B3 horizon is sandy loam, fine sandy loam, or loam.

The IIC horizon is neutral or has hue of 10YR or 2.5Y, value of 6 or 7, and chroma of 0 through 8. It is sand or loamy sand.

Myatt Series

The soils of the Myatt series are deep and poorly drained. They formed in loamy sediments of fluviomarine origin. Myatt soils are on broad, low-lying terraces. Slopes range from 0 to 2 percent.

Myatt soils commonly are near Emporia, Eunola, Lumbee, Pactolus, Slagle, and Suffolk soils. The Myatt soils are dominantly grayer than the Emporia, Eunola, Pactolus, Slagle, and Suffolk soils and have a thicker subsoil than the Lumbee soils.

Typical pedon of Myatt loam, 550 feet north of the junction of VA-3 and VA-645 and 80 feet west of VA-645:

A1—0 to 4 inches; dark grayish brown (10YR 4/2) loam; moderate medium granular structure; friable; many fine and medium roots; very strongly acid; clear wavy boundary.

A2—4 to 11 inches; light brownish gray (2.5Y 6/2) loam; common medium distinct yellowish brown (10YR 5/4) mottles; moderate medium subangular blocky structure; friable; many fine and few medium roots; very strongly acid; clear smooth boundary.

B21tg—11 to 19 inches; light brownish gray (10YR 6/2) clay loam; common medium distinct yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; friable; many fine roots; few thin patchy clay films on faces of peds; very strongly acid; clear smooth boundary.

B22tg—19 to 28 inches; gray (10YR 6/1) clay loam; common coarse distinct yellowish brown (10YR 5/6) and light yellowish brown (10YR 6/4) mottles; moderate medium subangular blocky structure; firm; many fine roots; common thin patchy clay films on faces of peds; very strongly acid; clear smooth boundary.

B23tg—28 to 40 inches; gray (10YR 6/1) sandy clay loam; many coarse distinct yellowish brown (10YR 5/4) mottles and common coarse distinct light yellowish brown (10YR 6/4) mottles; weak medium subangular blocky structure; friable; few fine roots; common thin patchy clay films on faces of peds; very strongly acid; clear smooth boundary.

B3g—40 to 49 inches; gray (10YR 6/1) fine sandy loam; common medium distinct yellowish brown (10YR 5/4) mottles; weak fine subangular blocky structure; friable; few fine roots; very strongly acid; clear smooth boundary.

Cg—49 to 60 inches; gray (10YR 6/1) loamy fine sand; few fine distinct pale brown (10YR 6/3) mottles; massive; very friable; very strongly acid.

The thickness of the solum ranges from 40 to 60 inches. Some pedons have a few iron and manganese concretions in the A and B horizons. The soil in unlimed areas is very strongly acid or strongly acid.

The A1 or Ap horizon has hue of 10YR or 2.5Y, value of 3 through 5, and chroma of 1 or 2. The A2 horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 1 or 2. The A horizon is loam or fine sandy loam.

The B2tg horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 1 or 2. It is loam, sandy clay loam, or clay loam.

The B3g horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 1 or 2. It is sandy loam, fine sandy loam, or sandy clay loam. Some pedons do not have a B3g horizon.

The C horizon has hue of 10YR or 2.5Y, value of 6 or 7, and chroma of 1 or 2. It is loamy sand, loamy fine sand, or sandy loam.

Nansemond Series

The soils of the Nansemond series are deep and moderately well drained. They formed in loamy marine and fluvial sediments. Nansemond soils are on broad upland terraces. Slopes range from 0 to 2 percent.

Nansemond soils commonly are near Catpoint, Eunola, Kenansville, Myatt, Pactolus, Rumford, and Suffolk soils. Nansemond soils have gray mottles in the lower part of the subsoil; the Catpoint, Kenansville, Rumford, and Suffolk soils do not. The Nansemond soils have less clay in the subsoil than the Eunola soils, more clay than the Pactolus soils, and a browner subsoil than the Myatt soils.

Typical pedon of Nansemond loamy fine sand, 6,000 feet east of the junction of VA-640 and VA-693, 30 feet south of VA-693:

Ap—0 to 10 inches; brown (10YR 4/3) loamy fine sand; weak fine granular structure; very friable, nonsticky, nonplastic; many fine roots; common very fine pores; strongly acid; gradual smooth boundary.

A2—10 to 18 inches; yellowish brown (10YR 5/4) loamy fine sand; weak fine granular structure; very friable, nonsticky, nonplastic; few fine roots; common fine pores; very strongly acid; gradual smooth boundary.

B21t—18 to 28 inches; dark yellowish brown (10YR 4/6) fine sandy loam; common medium distinct very pale brown (10YR 7/4) mottles; weak fine subangular blocky structure; very friable, slightly sticky, nonplastic; few fine roots; many fine pores; sand grains coated and bridged with clay; very strongly acid; clear wavy boundary.

B22t—28 to 44 inches; yellowish brown (10YR 5/6) sandy loam; common medium distinct light gray (10YR 7/2) mottles and many medium faint very pale brown (10YR 7/4) mottles; weak medium subangular blocky structure; friable, slightly sticky, nonplastic; common fine pores; sand grains coated and bridged with clay; common pockets and lenses of loamy sand; very strongly acid; clear wavy boundary.

C—44 to 60 inches; yellowish brown (10YR 5/6) loamy sand; many medium faint very pale brown (10YR 7/4) mottles and common medium faint strong brown (7.5YR 5/6) mottles; massive; very friable, nonsticky, nonplastic; few strong brown (7.5YR 5/6) concretions; very strongly acid.

The thickness of the solum ranges from 35 to 60 inches. The soil in unlimed areas ranges from extremely acid through strongly acid. Rounded gravel makes up 0 to 2 percent of the solum and substratum.

The A1 or Ap horizon has hue of 10YR or 2.5Y, value of 3 through 5, and chroma of 2 through 4. The A2 horizon has hue of 10YR or 2.5Y, value of 4 through 7, and chroma of 2 through 6. The A horizon is loamy sand, loamy fine sand, sandy loam, or fine sandy loam. Some pedons do not have an A2 horizon.

Some pedons have a B1 horizon that has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 3 through 6. It is sandy loam or fine sandy loam.

The B2t horizon has hue of 10YR or 2.5Y, value of 4 through 6, and chroma of 3 through 6. Some pedons have a B22t horizon that has hue of 10YR or 2.5Y, value of 4 through 7, and chroma of 2 through 8, and it is mottled. The B2t horizon mainly is sandy loam or fine sandy loam. Some pedons have a thin subhorizon of loam or sandy clay loam.

The C horizon has hue of 10YR or 2.5Y, value of 4 through 7, and chroma of 1 through 6. It mainly is loamy sand or loamy fine sand. Some pedons have lenses or strata of sandy loam or sandy clay loam.

Nevarc Series

The soils of the Nevarc series are deep and moderately well drained. They formed in clayey and loamy sediments. Nevarc soils are on upland side slopes. Slopes range from 6 to 45 percent.

Nevarc soils are in a complex with Emporia soils and in most places are near Suffolk and Remlik soils. The Nevarc soils have more clay in the argillic horizon than any of those soils.

Typical pedon of Nevarc silt loam, in an area of Emporia-Nevarc complex, 15 to 45 percent slopes, 1½ miles east of VA-640 on VA-693, 1/2 mile north of VA-693, on a farm lane and 250 feet south of Weeks Creek:

A1—0 to 3 inches; grayish brown (2.5Y 5/2) silt loam; weak fine granular structure; friable; many fine and medium roots; extremely acid; clear smooth boundary.

A2—3 to 14 inches; pale brown (10YR 6/3) loam; common medium distinct yellowish brown (10YR 5/6) mottles; weak fine granular structure; many fine and medium roots; very strongly acid; clear smooth boundary.

B21t—14 to 19 inches; yellowish brown (10YR 5/6) clay loam; common medium faint strong brown (7.5YR 5/6) mottles; moderate medium subangular blocky structure; firm; many fine and medium roots; many thin patchy clay films on faces of peds; extremely acid; gradual smooth boundary.

B22t—19 to 26 inches; strong brown (7.5YR 5/6) clay; common medium distinct red (2.5YR 4/6), light gray (7.5YR 7/2), and brownish yellow (10YR 6/6) mottles; weak medium prismatic structure parting to weak medium subangular blocky; firm; common fine roots; common thin patchy clay films on faces of peds; very strongly acid; gradual smooth boundary.

B23t—26 to 42 inches; strong brown (7.5YR 5/6) clay; many medium distinct red (2.5YR 4/6), pinkish gray (7.5YR 7/2), and brownish yellow (10YR 6/6) mottles; weak medium prismatic structure parting to weak medium subangular blocky; very firm; few fine roots; common thin patchy clay films on faces of peds; very strongly acid; gradual smooth boundary.

C1—42 to 51 inches; pinkish gray (7.5YR 7/2) clay; pockets of sandy clay; common medium distinct strong brown (7.5YR 5/6) and red (2.5YR 4/6) mottles; massive; firm; very strongly acid; clear smooth boundary.

C2—51 to 64 inches; strong brown (7.5YR 5/8) sandy clay loam; pockets of clay; common medium faint yellowish brown (10YR 5/6) and light brownish gray (10YR 6/2) mottles; massive; firm; very strongly acid.

The thickness of the solum ranges from 30 to 60 inches. The soil ranges from extremely acid through moderately acid. Quartz gravel makes up 0 to 2 percent of the soil.

The A1 horizon has hue of 7.5YR through 2.5Y, value of 2 through 5, and chroma of 2 through 4. The A2 horizon has hue of 10YR or 2.5Y, value of 5 through 7, and chroma of 3 through 8. The A horizon is very fine sandy loam, fine sandy loam, sandy loam, loam, or silt loam.

Some pedons have a B1 horizon that has hue of 7.5YR or 10YR, value of 4 through 7, and chroma of 4 through 8. It is loam, clay loam, sandy clay loam, or silty clay loam.

The upper part of the B2t horizon has hue of 5YR through 10YR, value of 4 through 7, and chroma of 4 through 8. The lower part of the B2t horizon has hue of 5YR through 2.5Y, value of 4 through 7, and chroma of 1 through 8. The B2t horizon is sandy clay loam, clay loam, sandy clay, silty clay loam, silty clay, or clay.

The hue, value, and chroma of the C horizon are variable. The horizon commonly is mottled in shades of gray, brown, yellow, and red. The C horizon is variable in texture and commonly is stratified or contains pockets of contrasting textures. It ranges from loamy sand to clay.

Ochlockonee Series

The soils of the Ochlockonee series are deep and well drained. They formed in stratified loamy alluvium. Ochlockonee soils are in intermittent drainageways and at the base of terraces. Slopes range from 0 to 3 percent.

Ochlockonee soils in most places are near Bibb, Emporia, Kinston, Nevarc, Remlik, Slagle, and Suffolk soils. The Ochlockonee soils are browner throughout than the Bibb and Kinston soils and do not have a well developed argillic horizon as do the Emporia, Nevarc, Remlik, Slagle, and Suffolk soils.

Typical pedon of Ochlockonee silt loam, 3,200 feet southwest of the intersection of VA-606 and US-17:

A1—0 to 7 inches; brown (10YR 5/3) silt loam; weak fine granular structure; very friable; many fine and medium roots; strongly acid; gradual smooth boundary.

C1—7 to 34 inches; yellowish brown (10YR 5/4) loam; moderate fine granular structure; very friable; few fine roots; strongly acid; gradual wavy boundary.

Ab—34 to 44 inches; dark grayish brown (10YR 4/2) sandy loam; weak fine granular structure; very friable; few fine roots; very strongly acid; clear wavy boundary.

IIC2—44 to 62 inches; yellowish brown (10YR 5/4) sandy loam; massive; very friable; few fine roots; strongly acid.

The soil commonly is very strongly acid or strongly acid. Buried horizons are at a depth of more than 25 inches.

The A horizon has hue of 10YR or 2.5Y, value of 3 through 6, and chroma of 2 through 4. It is sandy loam, fine sandy loam, loam, or silt loam.

The C horizon has hue of 7.5YR or 10YR, value of 4 through 6, and chroma of 3 through 6. The C horizon mainly is sandy loam, loam, silt loam, or sandy clay loam. Some pedons have thin gravel strata at a depth of more than 40 inches.

Pactolus Series

The soils of the Pactolus series are deep and moderately well or somewhat poorly drained. They formed in sandy sediments. Pactolus soils are mostly on low-lying terraces. Slopes range from 0 to 4 percent.

Pactolus soils in most places are near Catpoint, Kenansville, Myatt, Nansemond, Rumford, and Suffolk soils. The Pactolus soils do not have the thin lamellae typical of the Catpoint soils; do not have an argillic horizon as do the Kenansville, Nansemond, Rumford, and Suffolk soils; and are sandier and browner throughout than the Myatt soils.

Typical pedon of Pactolus loamy fine sand, 1.4 miles southwest of the junction of VA-3 and VA-630:

Ap—0 to 8 inches; dark brown (10YR 3/3) loamy fine sand; weak fine granular structure; very friable; many fine roots; strongly acid; clear smooth boundary.

C1—8 to 20 inches; light yellowish brown (10YR 6/4) loamy fine sand; single grain; loose; common fine roots; strongly acid; gradual smooth boundary.

C2—20 to 32 inches; yellowish brown (10YR 5/6) loamy fine sand; single grain; loose; few fine roots; very strongly acid; clear smooth boundary.

C3—32 to 42 inches; yellowish brown (10YR 5/4) fine sand; many medium distinct strong brown (7.5YR 5/6) mottles and few medium distinct light gray (10YR 7/2) mottles; single grain; loose; very strongly acid; clear smooth boundary.

C4—42 to 50 inches; light yellowish brown (10YR 6/4) fine sand; many medium distinct strong brown (7.5YR 5/6) mottles and common medium distinct light gray (10YR 7/2) mottles; single grain; loose; very strongly acid; clear smooth boundary.

C5—50 to 80 inches; mixed light gray (10YR 7/2) and pale brown (10YR 6/3) fine sand; many medium distinct light brown (7.5YR 6/4) mottles and common medium distinct brown (7.5YR 5/4) mottles; single grain; loose; very strongly acid.

The thickness of the sandy material is 80 inches or more. The soil in unlimed areas is very strongly acid or strongly acid.

The A1 or Ap horizon has hue of 10YR or 2.5Y, value of 3 or 4, and chroma of 2 or 3. It is loamy sand or loamy fine sand.

The upper part of the C horizon has hue of 10YR or 2.5Y, value of 5 through 7, and chroma of 3 through 6. It is loamy fine sand or fine sand. The lower part of the C horizon has hue of 10YR or 2.5Y, value of 5 through 8, and chroma of 1 through 4. Common to many high-chroma mottles are throughout the C horizon. Common to many low-chroma mottles indicative of wetness are at a depth of 20 to 40 inches. The lower part of the C horizon is fine sand or sand.

Pocaty Series

The soils of the Pocaty series are deep and very poorly drained. They formed in highly decomposed herbaceous plant remains. Pocaty soils are in tidal marshes along rivers and creeks. Slopes are less than 1 percent.

Pocaty soils in most places are near Bibb, Kenansville, Kinston, and Suffolk soils, but none of those soils has organic layers.

Typical pedon of Pocaty muck, 400 feet northwest of the end of VA-644, near the Piankatank River:

Oa1—0 to 6 inches; black (5Y 2/1) muck (sapric material); about 10 percent fiber rubbed; massive;

nonsticky; many fine and medium roots; weak sulfur odor; moderately acid; gradual smooth boundary.

Oa2—6 to 40 inches; black (5Y 2/1) muck (sapric material); about 15 percent fiber rubbed; massive; nonsticky; common fine roots; moderate sulfur odor; neutral; gradual smooth boundary.

Oa3—40 to 72 inches; black (5Y 2/2) muck (sapric material); about 5 percent fiber rubbed; massive; slightly sticky; squeezes easily between fingers; moderate sulfur odor; neutral.

The thickness of the organic layers is more than 51 inches. The sulfur content ranges from 0.75 percent to about 4.0 percent in some layer within 40 inches of the surface. The soil ranges from very strongly acid through neutral in its natural condition.

The organic material in the surface tier has hue of 7.5YR through 5Y, value of 2 through 4, and chroma of 1 through 3. It is hemic or sapric.

The organic material in the subsurface and bottom tier has hue of 7.5YR through 5Y, value of 2 through 4, and chroma of 1 through 4, or it is neutral and has value of 2 through 4.

Psamments

Psamments in this survey area consist dominately of sandy materials that have been disturbed or exposed during excavation, grading, or filling. They are mostly well drained and moderately well drained. The soil from the excavated areas has been used as foundation material for roads, buildings, and similar uses. Many of the fill areas consist of nonsoil materials such as stumps and old building materials. Slopes range from 0 to 60 percent but in most areas are 2 to 6 percent.

Psamments in most places are near Catpoint, Emporia, Kempsville, Rumford, and Suffolk soils and Udorthents. All of these soils except Udorthents are undisturbed and in their natural condition. Psamments have less clay throughout than Udorthents.

A typical pedon is not given for Psamments because of their variability. The soil materials range from extremely acid through strongly acid. They have hue of 7.5YR through 2.5Y, value of 4 through 8, and chroma of 1 through 4. They mostly are sand, fine sand, or loamy sand. Stratified layers of rounded quartz gravel are in some pedons.

Remlik Series

The soils of the Remlik series are deep and well drained. They formed in sandy and loamy sediments on Coastal Plain uplands. Slopes range from 6 to 45 percent.

Remlik soils are similar to Kenansville soils, are in a complex with Suffolk soils, and in most places are near Emporia and Ochlockonee soils. The Remlik soils are steeper than the Kenansville soils, have a thicker, sandier surface layer than the Suffolk or Emporia soils, and have an argillic horizon that is not typical in the Ochlockonee soils.

Typical pedon of Remlik loamy sand, in an area of Suffolk-Remlik complex, 15 to 45 percent slopes, 3.25 miles west of Deltaville, 0.8 mile south of the junction of VA-33 and VA-628 on a private road, and 300 feet west of the private road:

O1—2 inches to 0; partly decomposed hardwood leaves, pine needles, and twigs.

A1—0 to 3 inches; dark grayish brown (10YR 4/2) loamy sand; weak medium granular structure; very friable; many fine and medium roots; strongly acid; clear wavy boundary.

A2—3 to 27 inches; light yellowish brown (10YR 6/4) loamy sand; weak fine granular structure; very friable; many fine and medium roots; strongly acid; clear wavy boundary.

B1t—27 to 30 inches; strong brown (7.5YR 5/6) sandy loam; weak fine subangular blocky structure; friable; common fine and medium roots; clay bridging of sand grains; strongly acid; clear smooth boundary.

B2t—30 to 38 inches; strong brown (7.5YR 5/6) sandy clay loam; weak medium subangular blocky structure; friable; few fine roots; common medium clay films on faces of peds; strongly acid; gradual smooth boundary.

C—38 to 70 inches; brownish yellow (10YR 6/6) loamy fine sand; common lamellae of strong brown (7.5YR 5/6) sandy loam; massive; friable; few fine roots; strongly acid.

The thickness of the solum ranges from 30 to 60 inches. The soil in unlimed areas ranges from extremely acid through moderately acid.

The A1 horizon has hue of 10YR or 2.5Y, value of 2 through 5, and chroma of 2 through 4. The A2 horizon has hue of 7.5YR through 2.5Y, value of 5 through 7, and chroma of 3 through 8. The A horizon is fine sand, loamy sand, or loamy fine sand.

The B1 horizon has hue of 7.5YR or 10YR, value of 4 through 6, and chroma of 4 through 8. It is sandy loam, fine sandy loam, or loam. Some pedons do not have a B1 horizon.

The B2t horizon has hue mainly of 7.5YR or 10YR, value of 4 through 6, and chroma of 4 through 8. In some pedons the B2t horizon is mottled, and in some it has hue of 2.5Y. The B2t horizon is sandy loam, fine sandy loam, or sandy clay loam.

Some pedons have a B3 horizon that has hue, value, and chroma similar to those of the B2t horizon. The B3 horizon is loamy sand, loamy fine sand, sandy loam, or fine sandy loam.

The C or IIC horizon has hue of 7.5YR or 10YR, value of 5 through 7, and chroma of 2 through 8, or it is

mottled. The C horizon ranges from sand to loamy fine sand. Some pedons do not have lamellae.

Rumford Series

The soils of the Rumford series are deep and well drained. They formed in loamy fluvial sediments on uplands. Slopes range from 0 to 6 percent.

Rumford soils in most places are near Catpoint, Eunola, Nansemond, and Suffolk soils. The Rumford soils have an argillic horizon; the Catpoint soils do not have an argillic horizon. The Rumford soils do not have grayish colored mottles in the lower part of the argillic horizon as do the Eunola and Nansemond soils, and the Rumford soils have less clay in the argillic horizon than the Suffolk soils.

Typical pedon of Rumford fine sandy loam, 0 to 2 percent slopes, 1/2 mile south of the end of VA-644 on a farm road, and 30 feet west of the farm road:

A11—0 to 2 inches; dark brown (10YR 3/3) fine sandy loam; weak fine granular structure; very friable; many fine and medium roots; very strongly acid; clear smooth boundary.

A12—2 to 14 inches; yellowish brown (10YR 5/4) fine sandy loam; weak fine granular structure; very friable; many fine and medium roots; very strongly acid; clear wavy boundary.

B21t—14 to 20 inches; strong brown (7.5YR 5/6) fine sandy loam; weak fine subangular blocky structure; very friable; many fine and medium roots; common clay bridging between sand grains; strongly acid; gradual smooth boundary.

B22t—20 to 32 inches; strong brown (7.5YR 5/6) fine sandy loam; weak medium subangular blocky structure; friable; common fine and medium roots; common thin clay films on faces of peds and clay bridging between sand grains; strongly acid; gradual smooth boundary.

B23t—32 to 37 inches; strong brown (7.5YR 5/6) fine sandy loam; weak fine subangular blocky structure; very friable; common fine and medium roots; common clay bridging between sand grains; strongly acid; gradual smooth bounday.

C1—37 to 45 inches; yellowish brown (10YR 5/8) fine sandy loam; massive; very friable; few fine roots; strongly acid; clear smooth boundary.

C2—45 to 53 inches; yellowish brown (10YR 5/6) loamy fine sand; massive; very friable; few fine roots; strongly acid; clear smooth boundary.

C3—53 to 60 inches; yellow (10YR 7/8) fine sand; common medium distinct light gray (10YR 7/2) and strong brown (7.5YR 5/6) mottles; single grain; loose; few fine roots; strongly acid.

The thickness of the solum ranges from 30 to 50 inches. Rounded quartz gravel makes up 0 to 2 percent of the soil. The soil in unlimed areas is very strongly acid or strongly acid.

The A1 or Ap horizon has hue of 10YR, value of 3 through 6, and chroma of 2 through 4. It is loamy sand, loamy fine sand, or fine sandy loam.

The B horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 through 8. It is sandy loam, fine sandy loam, or sandy clay loam.

The C horizon has hue of 10YR or 2.5Y, value of 5 through 8, and chroma of 3 through 8. The C horizon of some pedons is white or light gray. The C horizon ranges from sand to fine sandy loam.

The Rumford soils in this survey area are a taxadjunct to the Rumford series because they have more silt in the solum than is defined in the range for the series. This difference does not significantly affect the use and management of the soils.

Slagle Series

The soils of the Slagle series are deep and moderately well drained. They formed in loamy fluvial and marine sediments. Slagle soils are on uplands. Slopes range from 0 to 6 percent.

Slagle soils in most places are near Ackwater, Craven, Kempsville, and Suffolk soils and are in a hydrosequence with Emporia soils. The Slagle soils have less clay in the upper part of the subsoil than the Ackwater or Craven soils, and are grayer in the lower part of the subsoil than the Kempsville, Suffolk, or Emporia soils.

Typical pedon of Slagle silt loam, 2 to 6 percent slopes, 1/2 mile southeast of the junction of the north end of VA-707 and US-33 near Grafton, 50 feet south of US-33:

Ap—0 to 9 inches; grayish brown (10YR 5/2) silt loam; moderate medium granular structure; friable; many fine roots; strongly acid; clear smooth boundary.

B1t—9 to 14 inches; pale brown (10YR 6/3) silt loam; weak medium subangular blocky structure; friable; many fine roots; few thin patchy clay films on faces of peds; strongly acid; gradual smooth boundary.

B21t—14 to 24 inches; light yellowish brown (10YR 6/4) loam; common medium faint very pale brown (10YR 7/3) mottles; moderate medium subangular blocky structure; friable; common fine roots; few thin clay films on faces of peds; strongly acid; gradual smooth boundary.

B22t—24 to 28 inches; mottled pale brown (10YR 6/3), light gray (10YR 7/1), yellowish red (5YR 4/6), and reddish yellow (5YR 6/6) loam; moderate medium subangular blocky structure; firm; common fine roots; few thin clay films on faces of peds; very strongly acid; gradual wavy boundary.

B23tg—28 to 38 inches; light gray (10YR 7/1) loam; many coarse distinct pale brown (10YR 6/3) mottles and common medium distinct reddish yellow (7.5YR 6/6) mottles; moderate thick platy structure parting

to moderate fine angular blocky; firm; few fine roots; few thin clay films on faces of peds; very strongly acid; gradual wavy boundary.

B24tg—38 to 52 inches; gray (10YR 6/1) and light gray (10YR 7/1) loam; common medium distinct strong brown (7.5YR 5/8) and light yellowish brown (10YR 6/4) mottles; moderate thick platy structure parting to moderate fine angular blocky; firm; few thin clay films on faces of peds; strongly acid; gradual wavy boundary.

B25tg—52 to 60 inches; mottled gray (10YR 6/1), brown (7.5YR 5/2), strong brown (7.5YR 5/8), and reddish yellow (7.5YR 6/6) loam; moderate thick platy structure parting to moderate fine angular blocky; firm; few thin clay films on faces of peds; few yellowish red (5YR 4/6) and reddish brown (5YR 5/3) oxide concretions 1/2 inch to 3 inches in diameter; concretions very firm in place; strongly acid.

The thickness of the solum is more than 40 inches. The soil in unlimed areas is very strongly acid or strongly acid.

The Ap or A1 horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 1 through 4. It is sandy loam, loam, or silt loam.

The B1 horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 3 through 5. It is sandy loam, loam, or silt loam.

The upper part of the B2t horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 3 through 6. It is sandy clay loam, clay loam, or loam. The lower part of the B2t horizon has hue of 7.5YR through 2.5Y, value of 5 through 7, and chroma of 1 through 6, or it is mottled or variegated. It is sandy clay loam, clay loam, loam, sandy clay, or clay.

Suffolk Series

The soils of the Suffolk series are deep and well drained. They formed in loamy marine and fluvial sediments. Suffolk soils are on uplands and side slopes. Slopes range from 0 to 45 percent.

Suffolk soils in most places are near Eunola, Kenansville, and Nansemond soils, are in a complex with Remlik soils, and are similar to Emporia, Kempsville, and Rumford soils. The Suffolk soils do not have grayish mottles in the lower part of the argillic horizon as do the Emporia, Eunola, and Nansemond soils. The Suffolk soils have a thinner solum than the Kempsville soils and more clay in the solum than the Rumford soils and have an A horizon that is thinner than and not as sandy as the A horizon of the Kenansville or Remlik soils.

Typical pedon of Suffolk fine sandy loam, 2 to 6 percent slopes, 3/4 mile east of Hardyville on VA-33, 3,000 feet south of VA-33, and 1,000 feet north of Healy's Creek:

A1—0 to 8 inches; dark yellowish brown (10YR 3/4) fine sandy loam; weak medium granular structure; very friable; many fine and medium roots; strongly acid; abrupt smooth boundary.

A2—8 to 12 inches; yellowish brown (10YR 5/4) fine sandy loam; moderate medium granular structure; very friable; common fine and medium roots; strongly acid; clear smooth boundary.

B1t—12 to 16 inches; light brown (7.5YR 6/4) fine sandy loam; weak medium subangular blocky structure; very friable; common fine and medium roots; clay bridging between sand grains; strongly acid; clear smooth boundary.

B2t—16 to 32 inches; strong brown (7.5YR 5/6) sandy clay loam; moderate medium subangular blocky structure; friable; common fine roots; common thin clay films on faces of peds; strongly acid; gradual smooth boundary.

B3t—32 to 38 inches; strong brown (7.5YR 5/6) fine sandy loam; weak medium subangular blocky structure; very friable; common fine roots; sand grains coated and bridged with clay; very strongly acid; gradual smooth boundary.

C1—38 to 52 inches; brownish yellow (10YR 6/6) loamy sand; massive; loose; common fine roots; very strongly acid; clear smooth boundary.

C2—52 to 62 inches; very pale brown (10YR 7/4) fine sand; few medium faint white (10YR 8/2) mottles; single grain; loose; few fine roots; very strongly acid.

The thickness of the solum ranges from 30 to 50 inches. The soil in unlimed areas is very strongly acid or strongly acid.

The Ap or A1 horizon has hue of 10YR, value of 3 through 6, and chroma of 2 through 4. The A2 horizon has hue of 10YR, value of 5 or 6, and chroma of 3 through 6. The A horizon is loamy sand, sandy loam, or fine sandy loam.

The B1 horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 4 through 6. It is sandy loam or fine sandy loam.

The B2t horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 4 through 8. It is sandy loam, fine sandy loam, or sandy clay loam.

The B3 horizon has hue, value, and chroma similar to those of the B2t horizon. The B3 horizon is loamy sand, sandy loam, or fine sandy loam.

The C horizon has hue of 7.5YR or 10YR, value of 5 through 7, and chroma of 2 through 8. It is sand, fine sand, or loamy sand. Some pedons have high- and low-chroma mottles.

Udorthents

Udorthents consist of deep, well drained and moderately well drained soils. Udorthents are mainly on uplands and consist mostly of areas that have been

disturbed or exposed during excavation, grading, or filling. Some areas have been excavated to a depth of up to 30 feet or more, and some have been filled by earthy and nonearthy materials. The areas are throughout the survey area. Slopes range from 0 to 60 percent but mainly are 2 to 6 percent.

Udorthents in most places are near Emporia, Kempsville, Rumford, and Suffolk soils and Psamments. All of those soils except Psamments have a well defined subsoil. Udorthents have more clay throughout than Psamments.

Because of the variability of Udorthents, a typical pedon is not given. The materials range from extremely acid through strongly acid. Rounded quartz gravel makes up 0 to 20 percent of some pedons. Thin, discontinuous ironstone fragments make up 0 to 50 percent of some pedons. Few fine mica flakes are in some pedons.

The surface layer has hue of 10YR or 2.5Y, value of 3 through 5, and chroma of 2 or 3. It is loamy sand, sandy loam, clay loam, or gravelly sandy loam. The surface layer ranges from about 2 to 10 inches thick, but it commonly is about 2 to 5 inches thick.

The lower layers extend to a depth of 60 inches or more. They have hue of 2.5YR through 10YR, value of 3 through 7, and chroma of 4 through 8. The material ranges from fine sandy loam to clay loam. Mottles with hue of 5YR through 2.5Y, value of 3 through 8, and chroma of 1 through 8 are in some pedons.

Formation of the Soils

In this section the factors and processes that have affected the formation and morphology of the soils in Middlesex County are described.

Factors of Soil Formation

Soils are formed through the interaction of five major factors: parent material, climate, plant and animal life, relief, and time. The relative influence of each factor varies from place to place, and in some places one factor dominates the formation of a soil and determines most of its properties and characteristics. This section describes the five major factors and the influence of each on the soils of Middlesex County.

Parent Material

Soils inherit many chemical and physical properties from their parent material. For example, beaches and point bars in stream channels are sandy, and thus the soils developed from those deposits also are sandy. In places where water movement is less active or where the wind has sorted and carried the material, silt deposition takes place and the soils are silty. In Middlesex County the common types of deposits are sandy or dominated by silt and clay.

The minerals in a soil provide the initial storehouse of plant nutrients. Some soils are naturally fertile and others infertile. Most of the soils in Middlesex County that are used for farming contain about 90 percent or more quartz in the sand-size particles. These soils are naturally acid and low in fertility, but crops on these soils respond well to fertilizer treatments.

Climate

Middlesex County has a humid, mild climate with a peak summer rainfall. This type of climate causes strong weathering and leaching in soils. Thus, calcium, magnesium, and potassium are removed from the soil and the soils are acid and have low natural fertility. A secondary result is that phosphorus becomes tied up with iron and aluminum in acid soils and is not available for crops. Farmers use liming and fertilization to reverse this process.

The moist condition in the county tends to accelerate weathering of silicate and aluminous minerals, which results in the formation of more clay. The clay is translocted from the surface layer to the subsoil. Maximum clay content in most soils is in the subsoil. In the Craven soils, for example, up to three times as much clay is in the subsoil as in the surface layer. The permeability of the subsoil is slower as a result.

Plant and Animal Life

Living organisms of all types influence soil formation. Vegetation adds organic matter to the soil through leaf fall and plant roots. The roots also create voids in the soil in which water and air can circulate. Many soil nutrients are stored in organic matter. Additionally, this organic matter supplies food for bacteria, fungi, earthworms, and ants, which aid in improving soil structure, an essential property for air and water movement.

Organisms also form organic compounds that influence soil formation. Many organic acids are formed that react with minerals, releasing nutrients such as phosphorus and potassium. Fungi commonly dominate in pine needle litter. These fungi may create water repellency if the litter becomes dry. Water beads on the litter as it does on a waxed metal surface, and the movement of water into the soil is hindered until the volume of water is great enough to break the surface tension.

Man influences soil formation through land use that causes erosion, compaction of the soil, and depletion of the natural soil fertility. Proper tillage, fertilization, and soil loss management, on the other hand, can change the soil into a more productive medium for plant growth. Man also mines the soil or alters the soil for construction purposes.

The rate of water infiltration into the soil is decreased and runoff is increased by construction activities and by the structures that result from construction. The additional runoff can increase erosion and cause flooding in low areas.

Relief

Middlesex County is in three major geologic landscape surfaces: (1) the Princess Anne surface—an area mostly east of Deltaville at an elevation between sea level and about 15 to 20 feet above sea level; (2) the Yorktown surface—an area along the Rappahannock and Piankatank Rivers and between elevations of about 20 and 50 feet above sea level; and (3) the Wicomico

surface—an area in the central part of the county between elevations of about 50 and 120 feet above sea level.

Each surface is separated from the next by escarpments that vary from gently sloping to very steep. The escarpment between the Princess Anne surface and the Yorktown surface, for instance, mostly is gently sloping or strongly sloping, but the escarpment between the Yorktown and the Wicomico surface mostly is steep or very steep.

Generally, the surfaces at the higher elevations are older than those at the lower elevations. Therefore, the soil parent materials have been exposed to the other soil forming factors for a longer period of time and the soils at higher elevations are considered to be "older" soils. The Princess Anne surface, for example, is nearly level and has poorly developed drainage patterns. The soils are mostly poorly drained and are not as well developed as some of the deeper, well drained soils on the highly dissected uplands of the Wicomico surface, for example. Consequently, the soils on the Princess Anne surface are considered somewhat "younger" than those on the Wicomico surface.

Each surface has a group of soils that are uniquely associated with it. For instance, poorly drained Myatt and Lumbee soils and moderately well drained Eunola soils mainly are on the Princess Anne surface. Well drained Bama, Emporia, and Kempsville soils and moderately well drained Slagle soils are dominant on the dissected uplands of the Wicomico surface.

In areas of low relief, water moves slowly on the surface and through the soil. Most soils in these areas are poorly drained. The subsoil in these soils tends to be gray or drab with reddish or yellowish splotches. These splotches are called mottles. Bethera and Pactolus soils have such mottles.

Time

As a factor of soil formation, time generally is related to the degree of development or degree of horizon differentiation within the soil. A soil that has little or no horizon development is considered a young soil, and one that has strongly developed horizons is considered an old, or mature, soil.

The oldest soils in the survey area are those formed on well drained uplands at higher elevations. These older soils, such as Bama and Emporia soils, have a strong degree of horizon differentiation. Young soils, such as Ochlockonee and Kinston soils, formed in recent alluvium, have been in place only a relatively short time, and show little or no horizon development. They commonly are stratified and have an irregular distribution of organic matter in the profile.

Morphology of Soils

The results of the interaction of the soil-forming factors can be distinguished by the different layers, or horizons, in a soil profile. The soil profile extends from the surface down to materials that are little altered by the soil-forming processes.

Most soils have three major horizons called A, B, and C horizons. These major horizons may be further subdivided by the use of numbers and letters to indicate changes within one horizon. An example would be the B2t horizon, a B horizon that has an accumulation of clay.

The A horizon is the surface layer. An A1 horizon is that part of the surface layer that has the largest accumulation of organic matter. The A horizon is also the layer of maximum leaching, or eluviation, of clay and iron. If considerable leaching has taken place and organic matter has not darkened the material, this horizon is called an A2 horizon.

The B horizon underlies the A horizon and commonly is called the subsoil. It is the horizon of maximum accumulation, or illuviation, of clay, iron, aluminum, or other compounds leached from the surface layer. In some soils the B horizon is formed by alteration in place rather than by illuviation. The alteration can be caused by oxidation and reduction of iron or by the weathering of clay minerals. The B horizon commonly has blocky or prismatic structure, and it generally is firmer and lighter in color than the A1 horizon but darker than the C horizon.

The C horizon is below the B horizon or, in some cases, below the A horizon. It consists of materials that are little altered by the soil-forming processes.

Processes of Soil Horizon Differentiation

In this survey area several processes are involved in the formation of soil horizons. Among these are the accumulation of organic matter, the leaching of soluble salts, the reduction and transfer of iron, the formation of soil structure, and the formation and translocation of clay minerals. These processes are continually taking place and generally at the same time throughout the profile. Such processes have been going on for thousands of years.

The accumulation and incorporation of organic matter takes place with the decomposition of plant residue. These additions darken the surface layer and help to form the A1 horizon. In many places, much of the surface layer has been eroded or has been mixed with materials from underlying layers through cultivation. Organic matter, once lost, normally takes a long time to replace. In Middlesex County the organic matter content of the surface layer varies from low in sandy soils, such as Catpoint soils, to high in organic marsh soils, such as

Pocaty soils. A low or moderate amount of organic matter is typical for most soils in the county.

For soils to have a distinct subsoil, it is believed that some of the lime and soluble salts must be leached before the translocation of clay minerals. Among the factors that affect this leaching are the kinds of salts originally present, the depth to which the soil solution percolates, and the texture of the soil profile.

Well drained and moderately well drained soils in the survey area have a yellowish brown to yellowish red subsoil. These colors are caused mainly by thin coatings of iron oxides on sand and silt grains, although in some soils the colors are inherited from the materials in which they formed. The structure is subangular blocky, and the subsoil contains more clay than the overlying surface horizons.

The reduction and transfer of iron, called gleying, is associated mainly with the wetter, more poorly drained soils. Moderately well drained soils, such as Slagle and Ackwater soils, have yellowish brown and strong brown mottles, which indicate the segregation of iron. In poorly drained soils, such as Myatt and Bethera soils, the subsoil and underlying materials are grayish, which indicates reduction and transfer of iron by removal in solution.

Mottles are caused by low soil oxygen content during water saturation. Iron, which is a common soil material, occurs in two forms. The red or yellow form is associated with freely available oxygen and is highly insoluble. The grayish form, associated with oxygen-deficient conditions, is more soluble and is created in water-saturated soils. The iron is mobilized and moves to soil areas with more oxygen. The iron is then fixed in place as reddish mottles. Mottles clearly indicate the top of the seasonal high water table, even when periods of dry weather lower the water table.

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Glossary

ABC soil. A soil having an A, a B, and a C horizon.

AC soil. A soil having only an A and a C horizon. Commonly such soil formed in recent alluvium or on steep rocky slopes.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Area reclaim (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as—

	Inches
Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	9 to 12
Very high	more than 12

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bottom land. The normal flood plain of a stream, subject to flooding.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Coarse fragments. If round, mineral or rock particles 2 millimeters to 25 centimeters (10 inches) in diameter; if flat, mineral or rock particles (flagstone) 15 to 38 centimeters (6 to 15 inches) long.

Coarse textured soil. Sand or loamy sand.

Colluvium. Soil material, rock fragments, or both moved by creep, slide, or local wash and deposited at the base of steep slopes.

Complex slope. Irregular or variable slope. Planning or constructing terraces, diversions, and other water-control measures on a complex slope is difficult.

Complex, soil. A map unit of two or more kinds of soil in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils are somewhat similar in all areas.

Compressible (in tables). Excessive decrease in volume of soft soil under load.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are common compounds in concretions.

Conservation tillage. A form of noninversion tillage that retains protective amounts of residue mulch on the surface throughout the year using no-tillage, strip tillage, stubble mulching, and other types of noninversion tillage.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard; little affected by moistening.

Contour stripcropping. Growing crops in strips that follow the contour. Strips of grass or close-growing

crops are alternated with strips of clean-tilled crops or summer fallow.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Corrosive. High risk of corrosion to uncoated steel or deterioration of concrete.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Deferred grazing. Postponing grazing or resting grazingland for a prescribed period.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained.—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.

Somewhat excessively drained.—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.

Well drained.—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.

Moderately well drained.—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically they are wet long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum, or periodically receive high rainfall, or both.

Somewhat poorly drained.—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.

Poorly drained.—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.

Very poorly drained.—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients.

Drainage, surface. Runoff, or surface flow of water, from an area.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Eolian soil material. Earthy parent material accumulated through wind action; commonly refers to sandy material in dunes or to loess in blankets on the surface.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of the activities of man or other animals or of a catastrophe in nature, for example, fire, that exposes the surface.

Excess fines (in tables). Excess silt and clay in the soil. The soil is not a source of gravel or sand for construction purposes.

Excess salts (in tables). Excess water-soluble salts in the soil that restrict the growth of most plants.

Excess sulfur (in tables). Excessive amount of sulfur in the soil. The sulfur causes extreme acidity if the soil is drained, and the growth of most plants is restricted.

Fast intake (in tables). The rapid movement of water into the soil.

Fibric soil material (peat). The least decomposed of all organic soil material. Peat contains a large amount of well preserved fiber that is readily identifiable according to botanical origin. Peat has the lowest bulk density and the highest water content at saturation of all organic soil material.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity.*

Fine textured soil. Sandy clay, silty clay, and clay.

First bottom. The normal flood plain of a stream, subject to frequent or occasional flooding.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Foot slope. The inclined surface at the base of a hill.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors and mottles.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock up to 3 inches (2 millimeters to 7.5 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that is 15 to 50 percent, by volume, rounded or angular rock fragments, not prominently flattened, up to 3 inches (7.5 centimeters) in diameter.

Green manure crop (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

Ground water (geology). Water filling all the unblocked pores of underlying material below the water table.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Hemic soil material (mucky peat). Organic soil material intermediate in degree of decomposition between the less decomposed fibric and the more decomposed sapric material.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an upper case letter represents the major horizons. Numbers or lower case letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the *Soil Survey Manual.* The major horizons of mineral soil are as follows:

O horizon.—An organic layer of fresh and decaying plant residue at the surface of a mineral soil.

A1 or Ap horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

A2 horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon.—The mineral horizon below an O, A, or E horizon. The B horizon is in part a layer of transition from the overlying horizon to the underlying C horizon. The B horizon also has distinctive characteristics such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these. The combined A and B horizons are generally called the solum, or true soil. If a soil does not have a B horizon, the A horizon alone is the solum.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the A or B horizon. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, the Roman numeral II precedes the letter C.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Infiltration capacity. The maximum rate at which water can infiltrate into a soil under a given set of conditions.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Intake rate. The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net irrigation application. The rate of water intake in inches per hour is expressed as follows:

Less than 0.2	very low
0.2 to 0.4	low
0.4 to 0.75	moderately low
0.75 to 1.25	moderate
1.25 to 1.75	moderately high
1.75 to 2.5	high
More than 2.5	very high

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are—
Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.
Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Leaching. The removal of soluble material from soil or other material by percolating water.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Low strength. The soil is not strong enough to support loads.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Moderately coarse textured soil. Sandy loam and fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, and silty clay loam.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—*few, common,* and *many*; size—*fine, medium,* and *coarse*; and contrast—*faint, distinct,* and *prominent*. The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium*, from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse*, more than 15 millimeters (about 0.6 inch).

Muck. Dark colored, finely divided, well decomposed organic soil material. (See Sapric soil material.)

Munsell notation. A designation of color by degrees of the three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color of 10YR hue, value of 6, and chroma of 4.

Neutral soil. A soil having a pH value between 6.6 and 7.3. (See Reaction, soil.)

Organic matter. Plant and animal residue in the soil in various stages of decomposition.

Parent material. The unconsolidated organic and mineral material in which soil forms.

Peat. Unconsolidated material, largely undecomposed organic matter, that has accumulated under excess moisture. (See Fibric soil material.)

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The downward movement of water through the soil.

Percs slowly (in tables). The slow movement of water through the soil adversely affecting the specified use.

Permeability. The quality of the soil that enables water to move downward through the profile. Permeability is measured as the number of inches per hour that water moves downward through the saturated soil. Terms describing permeability are:

Very slow	less than 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management. For example, slope, texture, and thickness.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Plowpan. A compacted layer formed in the soil directly below the plowed layer.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Poorly graded. Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Poor filter (in tables). Because of rapid permeability the soil may not adequately filter effluent from a waste disposal system.

Poor outlets (in tables). Refers to areas where surface or subsurface drainage outlets are difficult or expensive to install.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degree of acidity or alkalinity is expressed as—

	pH
Extremely acid	below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Moderately acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Relief. The elevations or inequalities of a land surface, considered collectively.

Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Saline soil. A soil containing soluble salts in an amount that impairs growth of plants. A saline soil does not contain excess exchangeable sodium.

Salty water (in tables). Water that is too salty for consumption by livestock.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sapric soil material (muck). The most highly decomposed of all organic soil material. Muck has the least amount of plant fiber, the highest bulk density, and the lowest water content at saturation of all organic soil material.

Seepage (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

Sequum. A sequence consisting of an illuvial horizon and the overlying eluvial horizon. (See Eluviation.)

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer or of the underlying material. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

Shrink-swell. The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silica. A combination of silicon and oxygen. The mineral form is called quartz.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75 feet.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

Slope (in tables). Slope is great enough that special practices are required to insure satisfactory performance of the soil for a specific use.

Slow intake (in tables). The slow movement of water into the soil.

Slow refill (in tables). The slow filling of ponds, resulting from restricted permeability in the soil.

Small stones (in tables). Rock fragments less than 3 inches (7.5 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes of separates recognized in the United States are as follows:

	Millimeters
Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and plant and animal activities are largely confined to the solum.

Stripcropping. Growing crops in a systematic arrangement of strips or bands which provide vegetative barriers to wind and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Stubble mulch. Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from wind and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Subsoiling. Breaking up a compact subsoil by pulling a special chisel through the soil.

Substratum. The part of the soil below the solum.

Subsurface layer. Technically, the A2 horizon. Generally refers to a leached horizon lighter in color and lower in content of organic matter than the overlying surface layer.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Thin layer (in tables). Otherwise suitable soil material too thin for the specified use.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Toe slope. The outermost inclined surface at the base of a hill; part of a foot slope.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Toxicity (in tables). Excessive amount of toxic substances, such as sodium or sulfur, that severely hinder establishment of vegetation or severely restrict plant growth.

Trace elements. Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, are in soils in extremely small amounts. They are essential to plant growth.

Unstable fill (in tables). Risk of caving or sloughing on banks of fill material.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Variant, soil. A soil having properties sufficiently different from those of other known soils to justify a new series name, but occurring in such a limited geographic area that creation of a new series is not justified.

Variegation. Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These

changes result in disintegration and decomposition of the material.

Well graded. Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

Tables

TABLE 1.--TEMPERATURE AND PRECIPITATION

[Data recorded in the period 1951-76 at Williamsburg, Virginia]

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average	2 years in 10 will have-- Maximum temperature higher than--	2 years in 10 will have-- Minimum temperature lower than--	Average number of growing degree days[1]	Average	2 years in 10 will have-- Less than--	2 years in 10 will have-- More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January-----	49.5	28.1	38.8	75	5	107	3.49	2.13	4.70	8	3.9
February----	52.1	29.9	41.0	76	9	117	3.71	2.30	4.97	8	1.9
March-------	59.8	36.1	48.0	85	17	280	4.11	2.95	5.16	8	1.6
April-------	70.9	45.3	58.1	91	27	543	2.88	1.61	3.91	7	.0
May---------	78.1	54.4	66.3	93	36	815	4.27	2.59	5.78	7	.0
June--------	84.8	62.4	73.6	98	46	1,008	4.43	2.47	6.02	6	.0
July--------	87.9	66.9	77.4	98	53	1,159	5.28	3.01	7.12	8	.0
August------	86.7	66.2	76.5	97	50	1,132	4.62	2.33	6.48	7	.0
September---	81.2	60.2	70.7	95	43	921	4.45	1.68	6.67	6	.0
October-----	71.2	48.8	60.0	88	28	620	3.61	1.21	5.53	5	.0
November----	62.0	38.6	50.3	82	19	314	2.89	1.23	4.25	5	.0
December----	52.1	30.9	41.5	75	9	167	3.55	2.02	4.79	6	1.3
Year------	69.7	47.3	58.5	99	4	7,183	47.29	39.87	55.01	81	8.7

[1]A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (40° F).

TABLE 2.--FREEZE DATES IN SPRING AND FALL

[Data were recorded in the period 1951-76 at Williamsburg, Virginia]

Probability	Temperature		
	24° F or lower	28° F or lower	32° F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	March 29	April 14	May 3
2 years in 10 later than--	March 24	April 9	April 27
5 years in 10 later than--	March 14	March 30	April 16
First freezing temperature in fall:			
1 year in 10 earlier than--	November 6	October 29	October 15
2 years in 10 earlier than--	November 12	November 3	October 20
5 years in 10 earlier than--	November 22	November 12	October 29

TABLE 3.--GROWING SEASON

[Data were recorded in the period 1951-76 at Williamsburg, Virginia]

Probability	Daily minimum temperature during growing season		
	Higher than 24° F	Higher than 28° F	Higher than 32° F
	Days	Days	Days
9 years in 10	231	206	175
8 years in 10	238	213	182
5 years in 10	253	226	196
2 years in 10	268	240	210
1 year in 10	275	247	217

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
1	Ackwater silt loam	1,330	1.6
2B	Bama loam, 2 to 6 percent slopes	1,090	1.3
3	Bethera and Daleville soils	1,680	2.0
4	Catpoint loamy sand	485	0.6
5A	Craven silt loam, 0 to 2 percent slopes	385	0.5
5B	Craven silt loam, 2 to 6 percent slopes	640	0.8
6A	Emporia loam, 0 to 2 percent slopes	1,015	1.2
6B	Emporia loam, 2 to 6 percent slopes	11,615	13.8
7D	Emporia-Nevarc complex, 6 to 15 percent slopes	4,870	5.8
7F	Emporia-Nevarc complex, 15 to 45 percent slopes	5,685	6.7
8	Eunola loam	2,870	3.4
9A	Kempsville sandy loam, 0 to 2 percent slopes	790	0.9
9B	Kempsville sandy loam, 2 to 6 percent slopes	8,835	10.5
10	Kenansville fine sand	580	0.7
11	Kinston-Bibb complex	5,770	6.8
12	Lumbee silt loam	365	0.4
13	Myatt loam	1,950	2.3
14	Nansemond loamy fine sand	425	0.5
15	Ochlockonee silt loam	840	1.0
16	Pactolus loamy fine sand	455	0.5
17	Pocaty muck	1,400	1.7
18A	Rumford fine sandy loam, 0 to 2 percent slopes	200	0.2
18B	Rumford fine sandy loam, 2 to 6 percent slopes	230	0.3
19A	Slagle silt loam, 0 to 2 percent slopes	4,240	5.0
19B	Slagle silt loam, 2 to 6 percent slopes	5,755	6.8
20A	Suffolk fine sandy loam, 0 to 2 percent slopes	4,555	5.4
20B	Suffolk fine sandy loam, 2 to 6 percent slopes	6,235	7.4
21D	Suffolk-Remlik complex, 6 to 15 percent slopes	2,390	2.8
21F	Suffolk-Remlik complex, 15 to 45 percent slopes	6,775	8.0
22B	Udorthents and Psamments, gently sloping	490	0.6
	Water	455	0.5
	Total	84,400	100.0

TABLE 5.--PRIME FARMLAND

[Only the soils considered prime farmland are listed. Urban or built-up areas of the soils listed are not considered prime farmland. If a soil is prime farmland only under certain conditions, the conditions are specified in parentheses after the soil name]

Map symbol	Soil name
2B	Bama loam, 2 to 6 percent slopes
5A	Craven silt loam, 0 to 2 percent slopes
5B	Craven silt loam, 2 to 6 percent slopes
6A	Emporia loam, 0 to 2 percent slopes
6B	Emporia loam, 2 to 6 percent slopes
8	Eunola loam
9A	Kempsville sandy loam, 0 to 2 percent slopes
9B	Kempsville sandy loam, 2 to 6 percent slopes
12	Lumbee silt loam (where drained)
13	Myatt loam (where drained)
19A	Slagle silt loam, 0 to 2 percent slopes
19B	Slagle silt loam, 2 to 6 percent slopes
20A	Suffolk fine sandy loam, 0 to 2 percent slopes
20B	Suffolk fine sandy loam, 2 to 6 percent slopes

TABLE 6.--YIELDS PER ACRE OF CROPS AND PASTURE

[Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil]

Soil name and map symbol	Corn	Corn silage	Soybeans	Wheat	Barley	Grass-legume hay	Tall fescue
	Bu	Tons	Bu	Bu	Bu	Tons	AUM*
1 Ackwater	70	14	25	25	35	2.5	5.0
2B Bama	125	25	40	55	75	5.0	7.0
3 Bethera and Daleville	105	21	35	45	55	3.5	5.8
4 Catpoint	60	12	20	25	40	5.0	7.5
5A Craven	90	18	25	40	50	3.5	5.8
5B Craven	90	18	25	40	50	3.5	5.8
6A Emporia	115	23	40	55	70	5.0	8.0
6B Emporia	115	23	40	50	65	5.0	8.0
7D Emporia-Nevarc	---	---	---	---	---	3.5	5.8
7F Emporia-Nevarc	---	---	---	---	---	---	---
8 Eunola	100	20	35	50	70	5.0	8.0
9A Kempsville	120	24	40	55	80	3.5	5.8
9B Kempsville	120	24	40	50	80	3.5	5.8
10 Kenansville	70	14	25	30	50	2.5	5.0
11 Kinston-Bibb	---	---	---	---	---	---	---
12 Lumbee	105	21	35	50	---	5.4	9.0
13 Myatt	105	21	35	50	60	4.0	6.6
14 Nansemond	95	19	30	45	55	2.0	3.0
15 Ochlockonee	100	20	35	50	70	4.5	7.4
16 Pactolus	65	13	25	25	40	2.0	3.0
17 Pocaty	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 6.--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Corn	Corn silage	Soybeans	Wheat	Barley	Grass-legume hay	Tall fescue
	Bu	Tons	Bu	Bu	Bu	Tons	AUM*
18A------------------------ Rumford	75	15	25	45	70	3.5	5.8
18B------------------------ Rumford	75	15	20	45	70	3.5	5.8
19A------------------------ Slagle	110	22	40	45	55	4.5	7.4
19B------------------------ Slagle	110	21	40	45	55	4.5	7.4
20A------------------------ Suffolk	90	18	35	55	70	3.5	5.8
20B------------------------ Suffolk	90	18	35	50	70	3.5	5.8
21D------------------------ Suffolk-Remlik	---	---	20	22	---	3.0	5.0
21F------------------------ Suffolk-Remlik	---	---	---	---	---	---	---
22B------------------------ Udorthents and Psamments	---	---	---	---	---	---	---

*Animal-unit-month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY

[Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that information was not available]

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Potential productivity: Common trees	Site index	Trees to plant
1------------------- Ackwater	3w	Slight	Moderate	Slight	Slight	Loblolly pine-------- Southern red oak---- White oak----------- Sweetgum------------	77 70 70 77	Loblolly pine, sweetgum.
2B------------------ Bama	2o	Slight	Slight	Slight	Slight	Loblolly pine-------- Yellow-poplar-------- Sweetgum------------	90 90 ---	Loblolly pine.
3*:								
Bethera------------	2w	Slight	Severe	Severe	Slight	Loblolly pine-------- Sweetgum------------ Water oak-----------	92 --- ---	Loblolly pine.
Daleville----------	2w	Slight	Severe	Severe	Moderate	Loblolly pine-------- Sweetgum------------ Water oak----------- Willow oak----------	95 90 --- ---	Loblolly pine, sweetgum.
4------------------- Catpoint	3s	Slight	Moderate	Moderate	Slight	Loblolly pine-------- Sweetgum------------ Water oak----------- Virginia pine--------	80 80 70 ---	Loblolly pine.
5A, 5B-------------- Craven	3w	Slight	Moderate	Slight	Slight	Loblolly pine-------- Water oak----------- Sweetgum------------ White oak----------- Virginia pine--------	81 --- --- --- ---	Loblolly pine.
6A, 6B-------------- Emporia	3o	Slight	Slight	Slight	Slight	Loblolly pine-------- Southern red oak---- Sweetgum------------ Yellow-poplar--------	75 70 --- ---	Loblolly pine.
7D*:								
Emporia------------	3o	Slight	Slight	Slight	Slight	Loblolly pine-------- Southern red oak---- Sweetgum------------ Yellow-poplar--------	75 70 --- ---	Loblolly pine.
Nevarc-------------	3c	Slight	Moderate	Slight	Slight	Loblolly pine-------- Southern red oak---- White oak----------- Sweetgum------------ Yellow-poplar--------	77 70 70 76 80	Loblolly pine.
7F*:								
Emporia------------	3r	Slight	Moderate	Slight	Slight	Loblolly pine-------- Southern red oak---- Sweetgum------------ Yellow-poplar--------	75 70 --- ---	Loblolly pine.
Nevarc-------------	3r	Moderate	Severe	Slight	Slight	Loblolly pine-------- Southern red oak---- White oak----------- Sweetgum------------ Yellow-poplar--------	77 70 70 76 80	Loblolly pine.
8------------------- Eunola	2w	Slight	Moderate	Slight	Slight	Loblolly pine-------- Sweetgum------------ Yellow-poplar--------	90 90 90	Loblolly pine, yellow-poplar.

See footnote at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Potential productivity: Common trees	Potential productivity: Site index	Trees to plant
9A, 9B------------ Kempsville	3o	Slight	Slight	Slight	Slight	Southern red oak----	74	Loblolly pine.
						Loblolly pine-------	82	
						Virginia pine-------	74	
						Sweetgum------------	80	
						Yellow-poplar-------	82	
10---------------- Kenansville	3s	Slight	Moderate	Moderate	Slight	Loblolly pine-------	80	Loblolly pine.
						Virginia pine-------	70	
11*:								
Kinston-----------	1w	Slight	Severe	Severe	Severe	Sweetgum------------	95	Green ash, sweetgum.
						Red maple-----------	70	
						Baldcypress---------	---	
						Green ash-----------	---	
Bibb--------------	2w	Slight	Severe	Severe	Severe	Loblolly pine-------	90	Sweetgum, yellow-poplar.
						Sweetgum------------	90	
						Water oak-----------	90	
						Blackgum------------	---	
						Baldcypress---------	---	
12---------------- Lumbee	2w	Slight	Severe	Severe	Moderate	Loblolly pine-------	94	Loblolly pine.
						Sweetgum------------	---	
						White oak-----------	---	
13---------------- Myatt	2w	Slight	Severe	Severe	Moderate	Loblolly pine-------	88	Loblolly pine.
						Sweetgum------------	92	
						Water oak-----------	86	
14---------------- Nansemond	2w	Slight	Moderate	Slight	Moderate	Loblolly pine-------	88	Loblolly pine, yellow-poplar, sweetgum.
						Sweetgum------------	90	
						Yellow-poplar-------	90	
						White oak-----------	---	
15---------------- Ochlockonee	1w	Slight	Moderate	Slight	Slight	Loblolly pine-------	100	Loblolly pine, sweetgum, yellow-poplar.
						Sweetgum------------	90	
						Yellow-poplar-------	90	
16---------------- Pactolus	3w	Slight	Moderate	Moderate	Slight	Loblolly pine-------	84	Loblolly pine.
18A, 18B---------- Rumford	3o	Slight	Slight	Slight	Slight	Southern red oak----	65	Loblolly pine.
						Virginia pine-------	70	
						Loblolly pine-------	74	
19A, 19B---------- Slagle	2w	Slight	Moderate	Slight	Slight	Loblolly pine-------	86	Loblolly pine, sweetgum, yellow-poplar.
						Sweetgum------------	86	
						Southern red oak----	76	
						Water oak-----------	76	
						Yellow-poplar-------	90	
20A, 20B---------- Suffolk	3o	Slight	Slight	Slight	Slight	Loblolly pine-------	76	Loblolly pine.
						Southern red oak----	70	

See footnote at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	
21D*:								
Suffolk	3o	Slight	Slight	Slight	Slight	Loblolly pine Southern red oak	76 70	Loblolly pine.
Remlik	3s	Slight	Slight	Moderate	Slight	Loblolly pine Virginia pine Yellow-poplar Southern red oak	80 74 80 74	Loblolly pine.
21F*:								
Suffolk	3r	Slight	Moderate	Slight	Slight	Loblolly pine Southern red oak	76 70	Loblolly pine.
Remlik	3r	Slight	Moderate	Moderate	Slight	Loblolly pine Virginia pine Yellow-poplar Southern red oak	80 74 80 74	Loblolly pine.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 8.--RECREATIONAL DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
1 Ackwater	Severe: percs slowly.	Severe: percs slowly.	Severe: percs slowly.	Moderate: wetness.	Moderate: wetness.
2B Bama	Slight	Slight	Moderate: slope.	Slight	Slight.
3*:					
Bethera	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Daleville	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
4 Catpoint	Slight	Slight	Moderate: slope, small stones.	Slight	Severe: droughty.
5A Craven	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Slight	Slight.
5B Craven	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Slight	Slight.
6A Emporia	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: small stones, percs slowly.	Slight	Slight.
6B Emporia	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, small stones, percs slowly.	Slight	Slight.
7D*:					
Emporia	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Slight	Moderate: slope.
Nevarc	Moderate: slope, wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: wetness, slope.
7F*:					
Emporia	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Nevarc	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
8 Eunola	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.
9A Kempsville	Slight	Slight	Moderate: small stones.	Slight	Slight.
9B Kempsville	Slight	Slight	Moderate: slope, small stones.	Slight	Slight.

See footnote at end of table.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
10-------------------- Kenansville	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Moderate: droughty.
11*:					
Kinston--------------	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness.	Severe: wetness, flooding.
Bibb-----------------	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness.	Severe: wetness, flooding.
12-------------------- Lumbee	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
13-------------------- Myatt	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
14-------------------- Nansemond	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness, droughty.
15-------------------- Ochlockonee	Severe: flooding.	Moderate: flooding.	Severe: flooding.	Moderate: flooding.	Severe: flooding.
16-------------------- Pactolus	Moderate: wetness.	Moderate: wetness.	Moderate: slope, wetness.	Moderate: wetness.	Moderate: droughty.
17-------------------- Pocaty	Severe: flooding, ponding, excess humus.	Severe: flooding, ponding, excess humus.	Severe: excess humus, ponding, flooding.	Severe: ponding, excess humus, flooding.	Severe: excess salt, excess sulfur, ponding.
18A------------------- Rumford	Slight----------	Slight----------	Moderate: small stones.	Slight----------	Slight.
18B------------------- Rumford	Slight----------	Slight----------	Moderate: slope, small stones.	Slight----------	Slight.
19A------------------- Slagle	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: wetness.	Moderate: wetness.
19B------------------- Slagle	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Moderate: wetness.	Moderate: wetness.
20A------------------- Suffolk	Slight----------	Slight----------	Slight----------	Slight----------	Slight.
20B------------------- Suffolk	Slight----------	Slight----------	Moderate: slope.	Slight----------	Slight.
21D*:					
Suffolk--------------	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight----------	Moderate: slope.
Remlik---------------	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight----------	Moderate: droughty, slope.

See footnote at end of table.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
21F*:					
Suffolk	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Remlik	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
22B*:					
Udorthents.					
Psamments.					

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 9.--WILDLIFE HABITAT

[See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
1-----------------Ackwater	Good	Good	Good	Good	Good	Poor	Fair	Good	Good	Poor.
2B----------------Bama	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
3*:										
Bethera-----------	Very poor.	Very poor.	Poor	Fair	Poor	Good	Good	Very poor.	Fair	Good.
Daleville---------	Poor	Fair	Fair	Good	Fair	Good	Good	Fair	Good	Good.
4-----------------Catpoint	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
5A----------------Craven	Good	Good	Good	Good	Good	Poor	Good	Good	Good	Poor.
5B----------------Craven	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
6A, 6B------------Emporia	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
7D*:										
Emporia-----------	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Nevarc------------	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
7F*:										
Emporia-----------	Very poor.	Fair	Good	Good	Good	Poor	Very poor.	Fair	Good	Very poor.
Nevarc------------	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
8-----------------Eunola	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
9A, 9B------------Kempsville	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
10----------------Kenansville	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
11*:										
Kinston-----------	Very poor.	Poor	Poor	Poor	Poor	Good	Fair	Poor	Poor	Fair.
Bibb--------------	Poor	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
12----------------Lumbee	Fair	Good	Good	Good	Good	Poor	Fair	Good	Good	Poor.
13----------------Myatt	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
14----------------Nansemond	Poor	Fair	Good	Good	Good	Poor	Poor	Fair	Good	Poor.

See footnote at end of table.

TABLE 9.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
15-----------------Ochlockonee	Poor	Fair	Fair	Good	Good	Poor	Very poor.	Fair	Good	Very poor.
16-----------------Pactolus	Fair	Fair	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
17-----------------Pocaty	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Good	Good	Very poor.	Very poor.	Good.
18A, 18B-----------Rumford	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
19A----------------Slagle	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
19B----------------Slagle	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
20A, 20B-----------Suffolk	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
21D*:										
Suffolk------------	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Remlik-------------	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
21F*:										
Suffolk------------	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Poor	Fair	Very poor.
Remlik-------------	Very poor.	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
22B*:										
Udorthents.										
Psamments.										

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 10.--BUILDING SITE DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition and does not eliminate the need for onsite investigation]

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
1----------------- Ackwater	Severe: wetness.	Severe: shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Moderate: wetness.
2B---------------- Bama	Slight---------	Slight---------	Slight---------	Moderate: slope.	Slight---------	Slight.
3*:						
Bethera----------	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, wetness.	Severe: wetness.
Daleville--------	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, wetness.	Severe: wetness.
4----------------- Catpoint	Severe: cutbanks cave.	Slight---------	Moderate: wetness.	Slight---------	Slight---------	Severe: droughty.
5A---------------- Craven	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: low strength.	Slight.
5B---------------- Craven	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell, slope.	Severe: low strength.	Slight.
6A---------------- Emporia	Moderate: wetness.	Slight---------	Moderate: wetness, shrink-swell.	Slight---------	Moderate: low strength.	Slight.
6B---------------- Emporia	Moderate: wetness.	Slight---------	Moderate: wetness, shrink-swell.	Moderate: slope.	Moderate: low strength.	Slight.
7D*:						
Emporia----------	Moderate: slope, wetness.	Moderate: slope.	Moderate: wetness, slope, shrink-swell.	Severe: slope.	Moderate: slope, low strength.	Moderate: slope.
Nevarc-----------	Severe: cutbanks cave, wetness.	Moderate: wetness, shrink-swell, slope.	Severe: wetness.	Severe: slope.	Severe: low strength.	Moderate: wetness, slope.
7F*:						
Emporia----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Nevarc-----------	Severe: cutbanks cave, wetness, slope.	Severe: slope.	Severe: wetness, slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
8----------------- Eunola	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.
9A---------------- Kempsville	Slight---------	Slight---------	Slight---------	Slight---------	Slight---------	Slight.
9B---------------- Kempsville	Slight---------	Slight---------	Slight---------	Moderate: slope.	Slight---------	Slight.

See footnote at end of table.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
10 Kenansville	Severe: cutbanks cave.	Slight	Moderate: wetness.	Slight	Slight	Moderate: droughty.
11*:						
Kinston	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding, low strength.	Severe: wetness, flooding.
Bibb	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding.	Severe: wetness, flooding.
12 Lumbee	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.
13 Myatt	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
14 Nansemond	Severe: wetness, cutbanks cave.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness, droughty.
15 Ochlockonee	Moderate: wetness.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.
16 Pactolus	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: droughty.
17 Pocaty	Severe: excess humus, ponding.	Severe: flooding, ponding, low strength.	Severe: flooding, ponding, low strength.	Severe: flooding, ponding, low strength.	Severe: low strength, ponding, flooding.	Severe: excess salt, excess sulfur, ponding.
18A Rumford	Severe: cutbanks cave.	Slight	Slight	Slight	Slight	Slight.
18B Rumford	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Slight	Slight.
19A Slagle	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell.	Moderate: low strength, wetness.	Moderate: wetness.
19B Slagle	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell, slope.	Moderate: low strength, wetness.	Moderate: wetness.
20A Suffolk	Severe: cutbanks cave.	Slight	Slight	Slight	Slight	Slight.
20B Suffolk	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Slight	Slight.
21D*:						
Suffolk	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: slope.
Remlik	Severe: cutbanks cave.	Moderate: slope.	Moderate: wetness, slope.	Severe: slope.	Moderate: slope.	Moderate: droughty, slope.
21F*:						
Suffolk	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

See footnote at end of table.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
21F*:						
Remlik-----------	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
22B*:						
Udorthents.						
Psamments.						

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 11.--SANITARY FACILITIES

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition and does not eliminate the need for onsite investigation]

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
1------------------ Ackwater	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, too clayey.	Moderate: wetness.	Poor: too clayey, hard to pack.
2B----------------- Bama	Slight-----------	Moderate: seepage, slope.	Slight-----------	Slight-----------	Good.
3*:					
Bethera------------	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
Daleville----------	Severe: wetness, percs slowly.	Slight-----------	Severe: wetness.	Severe: wetness.	Poor: wetness.
4------------------ Catpoint	Severe: poor filter.	Severe: seepage.	Severe: seepage, wetness, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
5A----------------- Craven	Severe: wetness, percs slowly.	Slight-----------	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack.
5B----------------- Craven	Severe: wetness, percs slowly.	Moderate: slope.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack.
6A, 6B------------- Emporia	Severe: wetness, percs slowly.	Severe: seepage, wetness.	Moderate: wetness, too clayey.	Slight-----------	Fair: too clayey, wetness.
7D*:					
Emporia------------	Severe: wetness, percs slowly.	Severe: seepage, slope, wetness.	Moderate: slope, wetness, too clayey.	Moderate: slope.	Fair: slope, too clayey, wetness.
Nevarc-------------	Severe: wetness, percs slowly.	Severe: seepage, slope, wetness.	Severe: seepage, wetness.	Severe: seepage.	Poor: too clayey, hard to pack.
7F*:					
Emporia------------	Severe: slope, wetness, percs slowly.	Severe: seepage, slope, wetness.	Severe: slope.	Severe: slope.	Poor: slope.
Nevarc-------------	Severe: wetness, percs slowly, slope.	Severe: seepage, slope, wetness.	Severe: seepage, wetness, slope.	Severe: seepage, slope.	Poor: too clayey, hard to pack, slope.
8------------------ Eunola	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: wetness.	Fair: wetness, thin layer.
9A----------------- Kempsville	Moderate: percs slowly.	Moderate: seepage.	Slight-----------	Slight-----------	Good.

See footnote at end of table.

TABLE 11.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
9B------------------ Kempsville	Moderate: percs slowly.	Moderate: seepage, slope.	Slight-----------	Slight-----------	Good.
10------------------ Kenansville	Moderate: wetness.	Severe: seepage.	Severe: seepage, wetness.	Severe: seepage.	Fair: too sandy.
11*:					
Kinston------------	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
Bibb---------------	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
12------------------ Lumbee	Severe: wetness.	Severe: seepage, flooding, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Poor: wetness.
13------------------ Myatt	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
14------------------ Nansemond	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Fair: too sandy, wetness.
15------------------ Ochlockonee	Severe: flooding, wetness.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, wetness.	Fair: wetness.
16------------------ Pactolus	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Fair: too sandy, wetness.
17------------------ Pocaty	Severe: flooding, seepage, ponding.	Severe: flooding, excess humus, ponding.	Severe: flooding, ponding, excess humus.	Severe: flooding, ponding.	Poor: ponding, excess humus.
18A, 18B------------ Rumford	Slight-----------	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
19A, 19B------------ Slagle	Severe: wetness, percs slowly.	Severe: seepage, wetness.	Severe: seepage, wetness.	Moderate: wetness.	Fair: too clayey, wetness.
20A, 20B------------ Suffolk	Slight-----------	Severe: seepage.	Severe: seepage.	Slight-----------	Fair: too clayey, thin layer.
21D*:					
Suffolk------------	Moderate: slope.	Severe: seepage, slope.	Severe: seepage.	Moderate: slope.	Fair: too clayey, slope, thin layer.
Remlik-------------	Moderate: wetness, slope.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.

See footnote at end of table.

TABLE 11.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
21F*:					
Suffolk-------------	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: slope.	Poor: slope.
Remlik--------------	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, too sandy, slope.
22B*:					
Udorthents.					
Psamments.					

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 12.--CONSTRUCTION MATERIALS

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," "poor," "probable," and "improbable." Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition and does not eliminate the need for onsite investigation]

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
1 Ackwater	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
2B Bama	Good	Improbable: excess fines.	Improbable: excess fines.	Good.
3*:				
Bethera	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, wetness.
Daleville	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
4 Catpoint	Good	Probable	Probable	Fair: too sandy, area reclaim.
5A, 5B Craven	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
6A, 6B Emporia	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
7D*:				
Emporia	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, slope.
Nevarc	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
7F*:				
Emporia	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Nevarc	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, slope.
8 Eunola	Fair: wetness.	Probable	Improbable: too sandy.	Good.
9A, 9B Kempsville	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
10 Kenansville	Good	Improbable: excess fines.	Improbable: excess fines.	Good.
11*:				
Kinston	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
Bibb	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
12 Lumbee	Poor: wetness.	Probable	Improbable: too sandy.	Poor: wetness.
13 Myatt	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
14 Nansemond	Fair: wetness.	Probable	Improbable: too sandy.	Fair: too sandy.
15 Ochlockonee	Good	Improbable: excess fines.	Improbable: excess fines.	Good.
16 Pactolus	Fair: wetness.	Probable	Improbable: too sandy.	Fair: too sandy.
17 Pocaty	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: excess humus, excess salt, wetness.
18A, 18B Rumford	Good	Improbable: thin layer.	Probable	Fair: area reclaim.
19A, 19B Slagle	Fair: low strength, wetness, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
20A, 20B Suffolk	Good	Probable	Improbable: too sandy.	Good.
21D*:				
Suffolk	Good	Probable	Improbable: too sandy.	Fair: slope.
Remlik	Good	Probable	Improbable: too sandy.	Fair: too sandy, slope.
21F*:				
Suffolk	Poor: slope.	Probable	Improbable: too sandy.	Poor: slope.
Remlik	Poor: slope.	Probable	Improbable: too sandy.	Poor: slope.
22B*:				
Udorthents.				
Psamments.				

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 13.--WATER MANAGEMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not evaluated. The information in this table indicates the dominant soil condition and does not eliminate the need for onsite investigation]

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Terraces and diversions	Grassed waterways
1----- Ackwater	Slight-----	Severe: hard to pack.	Severe: no water.	Percs slowly---	Erodes easily, wetness, percs slowly.	Erodes easily, percs slowly.
2B----- Bama	Moderate: seepage, slope.	Slight-----	Severe: no water.	Deep to water	Favorable-----	Favorable.
3*:						
Bethera-----	Slight-----	Severe: wetness.	Severe: slow refill.	Wetness, percs slowly.	Wetness, percs slowly.	Wetness, percs slowly.
Daleville-----	Slight-----	Severe: wetness.	Severe: slow refill.	Percs slowly---	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.
4----- Catpoint	Severe: seepage.	Severe: seepage, piping.	Severe: cutbanks cave.	Deep to water	Too sandy, soil blowing.	Droughty.
5A----- Craven	Slight-----	Moderate: hard to pack, wetness.	Severe: slow refill.	Percs slowly---	Erodes easily, wetness.	Erodes easily, percs slowly.
5B----- Craven	Slight-----	Moderate: hard to pack, wetness.	Severe: slow refill.	Percs slowly, slope.	Erodes easily, wetness.	Erodes easily, percs slowly.
6A----- Emporia	Moderate: seepage.	Moderate: thin layer, piping.	Severe: no water.	Deep to water	Soil blowing, percs slowly.	Percs slowly.
6B----- Emporia	Moderate: seepage, slope.	Moderate: thin layer, piping.	Severe: no water.	Deep to water	Soil blowing, percs slowly.	Percs slowly.
7D*, 7F*:						
Emporia-----	Severe: slope.	Moderate: thin layer, piping.	Severe: no water.	Deep to water	Slope, soil blowing, percs slowly.	Slope, percs slowly.
Nevarc-----	Severe: slope.	Severe: hard to pack.	Severe: no water.	Percs slowly, slope.	Slope, erodes easily, wetness.	Slope, erodes easily, percs slowly.
8----- Eunola	Moderate: seepage.	Severe: piping, wetness.	Severe: cutbanks cave.	Favorable-----	Wetness-----	Favorable.
9A----- Kempsville	Moderate: seepage.	Slight-----	Severe: no water.	Deep to water	Soil blowing---	Favorable.
9B----- Kempsville	Moderate: seepage, slope.	Slight-----	Severe: no water.	Deep to water	Soil blowing---	Favorable.
10----- Kenansville	Severe: seepage.	Moderate: seepage.	Severe: cutbanks cave.	Deep to water	Favorable-----	Droughty.
11*:						
Kinston-----	Moderate: seepage.	Severe: wetness.	Slight-----	Flooding-----	Wetness-----	Wetness.
Bibb-----	Moderate: seepage.	Severe: piping, wetness.	Moderate: slow refill.	Flooding-----	Wetness-----	Wetness.

See footnote at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Terraces and diversions	Grassed waterways
12----------------- Lumbee	Severe: seepage.	Severe: wetness.	Slight---------	Cutbanks cave	Wetness---------	Wetness.
13----------------- Myatt	Moderate: seepage.	Severe: piping, wetness.	Severe: slow refill.	Favorable------	Wetness---------	Wetness.
14----------------- Nansemond	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, soil blowing.	Droughty.
15----------------- Ochlockonee	Severe: seepage.	Severe: piping.	Severe: cutbanks cave.	Deep to water	Favorable------	Favorable.
16----------------- Pactolus	Severe: seepage.	Severe: seepage, piping.	Severe: cutbanks cave.	Cutbanks cave	Wetness---------	Droughty.
17----------------- Pocaty	Moderate: seepage.	Severe: excess humus, ponding.	Moderate: salty water.	Ponding, flooding, excess salt.	Ponding---------	Wetness, excess salt.
18A, 18B---------- Rumford	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Soil blowing---	Favorable.
19A---------------- Slagle	Moderate: seepage.	Moderate: wetness.	Severe: no water.	Percs slowly---	Wetness, percs slowly.	Percs slowly.
19B---------------- Slagle	Moderate: seepage, slope.	Moderate: wetness.	Severe: no water.	Percs slowly, slope.	Wetness, percs slowly.	Percs slowly.
20A---------------- Suffolk	Moderate: seepage.	Severe: piping, thin layer.	Severe: no water.	Deep to water	Soil blowing---	Favorable.
20B---------------- Suffolk	Moderate: seepage, slope.	Severe: piping, thin layer.	Severe: no water.	Deep to water	Soil blowing---	Favorable.
21D*, 21F*:						
Suffolk-----------	Severe: slope.	Severe: piping, thin layer.	Severe: no water.	Deep to water	Slope, soil blowing.	Slope.
Remlik------------	Severe: seepage, slope.	Severe: seepage, piping.	Severe: no water.	Deep to water	Slope, too sandy, soil blowing.	Slope, droughty.
22B*:						
Udorthents.						
Psamments.						

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 14.--ENGINEERING INDEX PROPERTIES

[The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated]

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
1----------------- Ackwater	0-6	Silt loam---------	SM, SC, CL-ML	A-4	0	95-100	95-100	65-95	45-90	<25	NP-8
	6-23	Loam, clay loam, silty clay loam.	CL, CH	A-6, A-7	0	95-100	95-100	85-100	65-90	25-55	10-30
	23-60	Silty clay loam, silty clay, clay.	CL, CH	A-7	0	95-100	95-100	85-100	75-95	40-75	15-45
2B---------------- Bama	0-4	Loam--------------	SM, SC, SM-SC, CL-ML	A-2, A-4	0	95-100	85-100	70-95	30-70	<30	NP-10
	4-32	Loam, sandy clay loam.	SM, SC, SM-SC, CL-ML	A-4, A-6	0	90-100	85-100	80-95	36-70	15-35	2-15
	32-60	Loam, sandy clay loam, clay loam.	SC, CL	A-4, A-6	0	85-100	80-100	80-95	40-70	20-40	8-18
3*:											
Bethera----------	0-6	Silt loam---------	CL	A-4, A-6	0	100	95-100	85-95	60-75	30-37	8-14
	6-60	Clay, clay loam, sandy clay.	CL, CH, ML, MH	A-6, A-7	0	100	98-100	93-100	55-95	37-55	12-30
Daleville--------	0-9	Loam--------------	ML, CL-ML	A-4	0	100	100	85-100	60-90	<30	NP-7
	9-60	Clay loam, loam, sandy clay loam.	CL	A-6	0	100	100	90-100	70-80	28-38	11-20
4----------------- Catpoint	0-11	Loamy sand--------	SM, SW-SM, SM-SC	A-1, A-2	0	85-100	75-100	40-70	10-35	<15	NP-5
	11-57	Sand, loamy fine sand.	SM, SW, SW-SM, SM-SC	A-1, A-2, A-3	0	65-100	60-100	30-70	4-35	<15	NP-5
	57-72	Fine sand, loamy loamy sand.	GM, SM, SW-SM	A-1, A-2, A-3	0-5	25-100	15-100	8-65	4-35	<10	NP
5A, 5B------------ Craven	0-2	Silt loam---------	ML, CL-ML, SM, SM-SC	A-4	0	100	100	75-100	45-90	<35	NP-7
	2-28	Clay, silty clay, silty clay loam.	CH	A-7	0	100	100	90-100	65-98	51-70	24-43
	28-66	Sandy clay loam, sandy loam, loamy sand.	SM, SM-SC, SC	A-2, A-4, A-6	0	100	95-100	50-100	15-49	<35	NP-15
6A, 6B------------ Emporia	0-8	Loam--------------	CL, SC, SM, ML	A-2, A-4, A-6	0-3	90-100	80-100	50-95	25-65	<25	NP-15
	8-31	Sandy clay loam, sandy loam, clay loam.	SC, CL	A-2, A-4, A-6, A-7	0-2	90-100	80-100	45-95	25-70	20-50	8-30
	31-59	Sandy clay loam, clay loam, sandy clay.	SC, CL	A-2, A-4, A-6, A-7	0-2	90-100	80-100	45-95	30-80	25-50	8-30
	59-66	Stratified sandy loam to clay loam.	SM, SC, ML, CL	A-1, A-2, A-4, A-6	0-5	70-100	55-100	30-90	20-60	<40	NP-25
7D, 7F*:											
Emporia----------	0-8	Loam--------------	CL, SC, SM, ML	A-2, A-4, A-6	0-3	90-100	80-100	50-95	25-65	<25	NP-15
	8-31	Sandy clay loam, sandy loam, clay loam.	SC, CL	A-2, A-4, A-6, A-7	0-2	90-100	80-100	45-95	25-70	20-50	8-30
	31-59	Sandy clay loam, clay loam, sandy clay.	SC, CL	A-2, A-4, A-6, A-7	0-2	90-100	80-100	45-95	30-80	25-50	8-30
	59-66	Stratified sandy loam to clay loam.	SM, SC, ML, CL	A-1, A-2, A-4, A-6	0-5	70-100	55-100	30-90	20-60	<40	NP-25

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
7D, 7F*:											
Nevarc----------	0-14	Silt loam--------	SM, SC, CL-ML	A-4	0	90-100	80-100	50-100	40-90	<30	NP-8
	14-51	Clay loam, clay, silty clay.	CL, CH	A-6, A-7	0	90-100	80-100	70-100	70-95	35-60	15-41
	51-64	Stratified loamy sand to sandy clay loam.	SM, SC, ML, CL	A-1, A-2, A-4, A-6	0-2	70-100	55-100	30-90	20-60	<40	NP-25
8--------------- Eunola	0-9	Loam-------------	SM	A-2, A-4	0	100	98-100	60-85	30-50	<25	NP-5
	9-28	Sandy clay loam, clay loam, loam.	SM, SC, SM-SC	A-4, A-2	0	100	98-100	75-95	30-45	<30	NP-10
	28-41	Sandy loam, loam	SM, SC	A-2, A-4	0	100	98-100	60-70	30-40	---	NP
	41-60	Sand, loamy sand	SM, SP-SM	A-2, A-3	0	100	98-100	50-75	5-30	---	NP
9A, 9B---------- Kempsville	0-6	Sandy loam-------	SM, SM-SC, ML, CL-ML	A-2, A-4	0-2	90-100	75-100	45-85	25-65	<18	NP-7
	6-62	Sandy clay loam, loam, fine sandy loam.	SC, CL	A-2, A-6	0-2	90-100	80-100	55-95	30-75	25-40	10-20
10-------------- Kenansville	0-26	Fine sand--------	SM	A-1, A-2	0	100	95-100	45-60	10-25	<25	NP-3
	26-48	Sandy loam, fine sandy loam, sandy clay loam.	SM, SC, SM-SC	A-2, A-4	0	100	95-100	50-75	20-40	<30	NP-10
	48-60	Sand, loamy sand, fine sand.	SP-SM, SM, SP	A-1, A-2, A-3	0	100	95-100	40-60	5-30	---	NP
11*:											
Kinston---------	0-10	Loam-------------	ML, CL, CL-ML	A-4, A-6	0	100	98-100	85-100	50-97	17-40	4-15
	10-50	Loam, clay loam, sandy clay loam.	CL	A-4, A-6, A-7	0	100	95-100	75-100	60-95	20-45	8-22
	50-60	Variable---------	---	---	0	---	---	---	---	---	---
Bibb------------	0-10	Sandy loam-------	SM, SM-SC, ML, CL-ML	A-2, A-4	0-5	95-100	90-100	60-90	30-60	<25	NP-7
	10-60	Sandy loam, loam, loamy sand, sand	SM, SM-SC, ML, CL-ML	A-2, A-4	0-10	60-100	50-100	40-100	30-90	<30	NP-7
12-------------- Lumbee	0-7	Silt loam--------	SM, SM-SC	A-2, A-4	0	100	85-100	65-98	15-45	<20	NP-7
	7-27	Loam, silt loam, sandy loam.	SC, CL	A-4, A-6, A-7	0	100	90-100	65-98	36-60	19-45	7-25
	27-60	Loamy sand, sand, fine sand.	SP, SM, SP-SM	A-2, A-3	0	90-100	85-100	50-90	4-25	---	NP

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag-ments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas-ticity index
	In				Pct					Pct	
13---------------- Myatt	0-11	Loam----------------	SM, SM-SC, ML, CL-ML	A-2, A-4	0	95-100	95-100	60-90	30-70	<25	NP-5
	11-40	Loam, sandy clay loam, clay loam.	SM, SC, ML, CL	A-4	0	95-100	95-100	80-100	40-80	<30	NP-10
	40-60	Fine sandy loam, sandy clay loam, loamy fine sand.	SM-SC, SC, CL-ML, CL	A-6, A-4, A-2	0	75-100	60-90	60-80	30-70	15-40	5-20
14---------------- Nansemond	0-18	Loamy fine sand	SM, SM-SC	A-1, A-2, A-4	0	100	95-100	45-95	15-50	<20	NP-7
	18-44	Fine sandy loam, sandy loam.	SM, SM-SC, SC	A-2, A-4, A-6	0	100	95-100	60-85	30-50	<25	NP-15
	44-60	Loamy fine sand, loamy sand.	SM, SM-SC	A-2, A-4	0	100	95-100	45-95	15-50	<25	NP-10
15---------------- Ochlockonee	0-7	Silt loam----------	ML, CL-ML	A-4	0	100	95-100	95-100	50-90	<30	NP-7
	7-34	Loam, sandy loam, silt loam.	SM, ML, SC, CL	A-4	0	100	95-100	95-100	36-75	<32	NP-9
	34-62	Loam, sandy loam silt loam.	SM, ML, CL, SC	A-4, A-2	0	100	95-100	85-99	13-80	<32	NP-9
16---------------- Pactolus	0-32	Loamy fine sand	SM	A-2	0	100	90-100	51-95	13-30	---	NP
	32-80	Fine sand, loamy sand, loamy fine sand.	SP-SM, SM	A-2, A-3	0	100	90-100	51-95	5-30	---	NP
17---------------- Pocaty	0-6	Muck----------------	Pt	A-8	---	---	---	---	---	---	---
	6-72	Mucky peat, muck	Pt	A-8	---	---	---	---	---	---	---
18A, 18B---------- Rumford	0-14	Fine sandy loam	SM, SM-SC	A-2, A-4	0	90-100	85-100	55-85	30-50	<25	NP-6
	14-37	Fine sandy loam, sandy loam.	SM, SC, SM-SC	A-2, A-4, A-6	0	80-100	75-100	55-85	30-50	<34	NP-12
	37-60	Fine sandy loam, loamy fine sand, fine sand.	SM, SP, GP, GM	A-1, A-2, A-3, A-4	0	50-100	35-100	20-85	2-40	<25	NP-6
19A, 19B---------- Slagle	0-9	Silt loam----------	SM, SC, ML, CL	A-2, A-4, A-6	0-3	95-100	90-100	55-95	30-75	<35	NP-15
	9-24	Silt loam, sandy clay loam, loam.	SC, SM-SC, CL, CL-ML	A-4, A-6	0-2	95-100	90-100	65-85	35-60	20-40	5-20
	24-60	Sandy clay loam, loam, clay loam.	SC, CL	A-4, A-6, A-7	0-2	95-100	90-100	75-95	40-75	25-50	8-30
20A, 20B---------- Suffolk	0-8	Fine sandy loam	SM, SM-SC, ML, CL-ML	A-2, A-4	0	95-100	90-100	50-80	25-60	<20	NP-7
	8-38	Sandy clay loam, fine sandy loam.	SC, CL	A-2, A-6	0	95-100	90-100	50-95	25-75	20-40	10-25
	38-62	Loamy fine sand, fine sandy loam, fine sand.	SP, SM, SM-SC	A-1, A-2, A-3, A-4	0	75-100	60-100	30-80	3-50	<18	NP-7
21D, 21F*: Suffolk----------	0-8	Fine sandy loam	SM, SM-SC, ML, CL-ML	A-2, A-4	0	95-100	90-100	50-80	25-60	<20	NP-7
	8-38	Sandy clay loam, fine sandy loam.	SC, CL	A-2, A-6	0	95-100	90-100	50-95	25-75	20-40	10-25
	38-62	Loamy fine sand, fine sandy loam, fine sand.	SP, SM, SM-SC	A-1, A-2, A-3, A-4	0	75-100	60-100	30-80	3-50	<18	NP-7

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
21D, 21F*:											
Remlik----------	0-27	Loamy sand-------	SM, SW-SM, SM-SC	A-1, A-2	0	90-100	80-100	40-70	10-35	<15	NP-5
	27-38	Sandy loam, sandy clay loam.	SM, SC, SM-SC	A-2, A-4, A-6	0	98-100	95-100	60-95	30-75	<30	NP-15
	38-70	Stratified sand to loamy sand.	SM, SP-SM, SM-SC	A-2, A-3	0	95-100	95-100	50-90	5-35	<18	NP-7
22B*:											
Udorthents.											
Psamments.											

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS

[The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Organic matter" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated]

Soil name and map symbol	Depth	Clay	Moist bulk density	Permea-bility	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	G/cm3	In/hr	In/in	pH	Mmhos/cm				Pct
1----------------	0-6	8-15	1.20-1.30	0.6-2.0	0.10-0.17	3.6-5.5	<2	Low---------	0.43	2	.5-2
Ackwater	6-23	25-40	1.30-1.40	0.2-0.6	0.12-0.19	3.6-5.5	<2	Moderate----	0.32		
	23-60	35-60	1.30-1.50	0.06-0.2	0.12-0.16	3.6-5.5	<2	High--------	0.32		
2B---------------	0-4	7-22	1.30-1.40	0.6-6.0	0.08-0.15	4.5-6.0	<2	Low---------	0.24	5	.5-1
Bama	4-32	18-32	1.35-1.45	0.6-2.0	0.12-0.18	4.5-5.5	<2	Low---------	0.32		
	32-60	20-35	1.35-1.50	0.6-2.0	0.12-0.18	4.5-5.5	<2	Low---------	0.32		
3*:											
Bethera----------	0-6	10-20	1.20-1.40	0.6-2.0	0.11-0.16	3.6-5.5	<2	Low---------	0.28	5	1-2
	6-60	35-50	1.30-1.50	0.06-0.6	0.14-0.18	3.6-5.5	<2	Moderate----	0.32		
Daleville--------	0-9	10-20	1.40-1.50	0.6-2.0	0.18-0.20	4.5-5.5	<2	Low---------	0.32	5	.5-2
	9-60	20-35	1.40-1.50	0.06-0.2	0.16-0.20	4.5-5.5	<2	Moderate----	0.37		
4----------------	0-11	0-10	1.20-1.50	6.0-20	0.06-0.10	4.5-6.5	<2	Low---------	0.10	5	.5-1
Catpoint	11-57	0-10	1.45-1.65	6.0-20	0.02-0.10	4.5-6.5	<2	Low---------	0.10		
	57-72	0-10	1.45-1.65	>6.0	0.01-0.08	4.5-6.5	<2	Low---------	0.10		
5A, 5B-----------	0-2	6-20	1.30-1.55	0.6-2.0	0.12-0.18	3.6-6.5	<2	Low---------	0.37	5	.5-2
Craven	2-28	35-60	1.30-1.45	0.06-0.2	0.12-0.15	3.6-5.5	<2	Moderate----	0.32		
	28-66	5-35	1.35-1.60	0.2-6.0	0.08-0.14	3.6-5.5	<2	Low---------	0.32		
6A, 6B-----------	0-8	7-18	1.30-1.40	2.0-6.0	0.10-0.17	4.5-5.5	<2	Low---------	0.28	4	.5-2
Emporia	8-31	18-35	1.35-1.45	0.6-2.0	0.10-0.18	4.5-5.5	<2	Low---------	0.28		
	31-59	21-40	1.45-1.60	0.06-0.6	0.10-0.16	4.5-5.5	<2	Moderate----	0.20		
	59-66	5-40	1.45-1.60	0.06-2.0	0.08-0.18	4.5-5.5	<2	Moderate----	0.20		
7D, 7F*:											
Emporia----------	0-8	7-18	1.30-1.40	2.0-6.0	0.10-0.17	4.5-5.5	<2	Low---------	0.28	4	.5-2
	8-31	18-35	1.35-1.45	0.6-2.0	0.10-0.18	4.5-5.5	<2	Low---------	0.28		
	31-59	21-40	1.45-1.60	0.06-0.6	0.10-0.16	4.5-5.5	<2	Moderate----	0.20		
	59-66	5-40	1.45-1.60	0.06-2.0	0.08-0.18	4.5-5.5	<2	Moderate----	0.20		
Nevarc-----------	0-14	10-25	1.20-1.30	0.6-2.0	0.10-0.15	3.6-6.0	<2	Low---------	0.37	3	.5-2
	14-51	35-55	1.30-1.50	0.06-0.2	0.10-0.17	3.6-6.0	<2	Moderate----	0.24		
	51-64	10-35	1.30-1.50	0.6-6.0	0.06-0.12	3.6-6.0	<2	Low---------	0.20		
8----------------	0-9	10-17	1.35-1.65	2.0-6.0	0.10-0.14	4.5-5.5	<2	Low---------	0.20	5	.5-2
Eunola	9-28	18-35	1.35-1.65	0.6-2.0	0.12-0.17	4.5-5.5	<2	Low---------	0.28		
	28-41	8-17	1.35-1.65	2.0-6.0	0.10-0.14	4.5-5.5	<2	Low---------	0.24		
	41-60	2-11	1.45-1.75	6.0-20	0.02-0.06	4.5-5.5	<2	Low---------	0.20		
9A, 9B-----------	0-6	5-18	1.30-1.40	2.0-6.0	0.10-0.16	4.5-5.5	<2	Low---------	0.32	4	.5-2
Kempsville	6-62	18-35	1.35-1.65	0.6-2.0	0.12-0.18	4.5-5.5	<2	Low---------	0.24		
10---------------	0-26	3-10	1.50-1.70	6.0-20	0.04-0.10	4.5-5.5	<2	Low---------	0.15	5	.5-1
Kenansville	26-48	5-18	1.30-1.50	2.0-6.0	0.10-0.15	4.5-5.5	<2	Low---------	0.15		
	48-60	1-10	1.50-1.70	6.0-20	<0.05	4.5-5.5	<2	Low---------	0.15		

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	G/cm^3	In/hr	In/in	pH	Mmhos/cm				Pct
11*:											
Kinston----------	0-10	5-27	1.30-1.50	0.6-2.0	0.14-0.20	4.5-5.5	<2	Low----------	0.37	5	.5-2
	10-50	18-35	1.30-1.50	0.6-2.0	0.14-0.18	4.5-5.5	<2	Low----------	0.32		
	50-60	---	---	---	---	---	---	-------------	----		
Bibb-------------	0-10	2-18	1.35-1.50	0.6-2.0	0.12-0.18	4.5-5.5	<2	Low----------	0.20	5	.5-2
	10-60	2-18	1.40-1.60	0.6-2.0	0.12-0.20	4.5-5.5	<2	Low----------	0.37		
12---------------- Lumbee	0-7	4-18	1.55-1.70	2.0-6.0	0.08-0.12	4.5-5.5	<2	Low----------	0.24	5	2-4
	7-27	18-35	1.30-1.45	0.6-2.0	0.12-0.16	4.5-5.5	<2	Low----------	0.32		
	27-60	1-10	1.60-1.75	6.0-20	0.03-0.06	4.5-5.5	<2	Low----------	0.10		
13---------------- Myatt	0-11	7-20	1.30-1.40	0.6-2.0	0.11-0.20	4.5-5.5	<2	Low----------	0.28	5	.5-2
	11-40	18-35	1.30-1.45	0.6-2.0	0.12-0.20	4.5-5.5	<2	Low----------	0.28		
	40-60	7-30	1.40-1.60	0.2-2.0	0.10-0.20	4.5-5.5	<2	Low----------	0.24		
14---------------- Nansemond	0-18	4-12	1.20-1.45	2.0-20	0.05-0.10	3.6-5.5	<2	Low----------	0.15	3	.5-1
	18-44	10-20	1.25-1.45	2.0-6.0	0.09-0.14	3.6-5.5	<2	Low----------	0.17		
	44-60	4-12	1.30-1.55	6.0-20	0.05-0.10	3.6-5.5	<2	Low----------	0.15		
15---------------- Ochlockonee	0-7	7-22	1.25-1.40	2.0-6.0	0.10-0.20	4.5-5.5	<2	Low----------	0.24	5	.5-2
	7-34	8-18	1.30-1.45	0.6-2.0	0.10-0.20	4.5-5.5	<2	Low----------	0.20		
	34-62	3-18	1.30-1.45	2.0-6.0	0.06-0.12	4.5-5.5	<2	Low----------	0.17		
16---------------- Pactolus	0-32	2-12	1.60-1.75	6.0-20	0.05-0.10	4.5-5.5	<2	Low----------	0.10	5	.5-2
	32-80	2-12	1.60-1.75	6.0-20	0.03-0.07	4.5-5.5	<2	Low----------	0.10		
17---------------- Pocaty	0-6	---	0.05-0.20	2.0-6.0	0.15-0.20	4.5-7.3	2-16	Low----------	----	---	---
	6-72	---	0.10-0.35	0.6-2.0	0.20-0.25	4.5-7.3	2-16	Low----------	----		
18A, 18B---------- Rumford	0-14	6-15	1.25-1.45	2.0-6.0	0.08-0.14	4.5-5.5	<2	Low----------	0.24	4	.5-2
	14-37	8-18	1.25-1.45	2.0-6.0	0.10-0.15	4.5-5.5	<2	Low----------	0.17		
	37-60	2-18	1.25-1.50	2.0-20	0.04-0.10	4.5-5.5	<2	Low----------	0.17		
19A, 19B---------- Slagle	0-9	8-22	1.30-1.45	2.0-6.0	0.10-0.17	4.5-5.5	<2	Low----------	0.24	3	.5-2
	9-24	12-35	1.30-1.45	0.6-2.0	0.10-0.18	4.5-5.5	<2	Low----------	0.24		
	24-60	18-40	1.35-1.60	0.06-0.6	0.12-0.18	4.5-5.5	<2	Moderate-----	0.24		
20A, 20B---------- Suffolk	0-8	6-18	1.35-1.45	2.0-6.0	0.12-0.15	4.5-5.5	<2	Low----------	0.28	4	.5-2
	8-38	10-33	1.40-1.50	0.6-2.0	0.12-0.20	4.5-5.5	<2	Low----------	0.28		
	38-62	4-10	1.40-1.50	2.0-20	0.04-0.10	4.5-5.5	<2	Low----------	0.17		
21D, 21F*:											
Suffolk----------	0-8	6-18	1.35-1.45	2.0-6.0	0.12-0.15	4.5-5.5	<2	Low----------	0.28	4	.5-2
	8-38	10-33	1.40-1.50	0.6-2.0	0.12-0.20	4.5-5.5	<2	Low----------	0.28		
	38-62	4-10	1.40-1.50	2.0-20	0.04-0.10	3.6-6.0	<2	Low----------	0.17		
Remlik-----------	0-27	0-10	1.20-1.50	>6.0	0.06-0.10	3.6-6.0	<2	Low----------	0.10	5	.5-1
	27-38	8-25	1.20-1.35	0.6-2.0	0.10-0.17	3.6-6.0	<2	Low----------	0.20		
	38-70	2-12	1.35-1.55	>6.0	0.04-0.10	3.6-6.0	<2	Low----------	0.17		
22B*:											
Udorthents.											
Psamments.											

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 16.--SOIL AND WATER FEATURES

["Flooding" and "water table" and terms such as "rare," "brief," "apparent," and "perched" are explained in the text The symbol > means more than. Absence of an entry indicates that the feature is not a concern]

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Bedrock		Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hard-ness	Uncoated steel	Concrete
					Ft			In			
1----------------- Ackwater	D	None---------	---	---	1.5-3.0	Perched	Nov-Mar	>60	---	High-----	High.
2B---------------- Bama	B	None---------	---	---	>6.0	---	---	>60	---	Low-------	Moderate.
3*:											
Bethera-----------	D	None---------	---	---	0.5-1.0	Apparent	Dec-Apr	>60	---	High-----	High.
Daleville---------	D	None---------	---	---	0.5-1.0	Apparent	Nov-May	>60	---	High-----	High.
4----------------- Catpoint	A	None---------	---	---	4.0-6.0	Apparent	Feb-Apr	>60	---	Low-------	Moderate.
5A, 5B------------ Craven	C	None---------	---	---	2.0-3.0	Apparent	Dec-Apr	>60	---	High-----	High.
6A, 6B------------ Emporia	C	None---------	---	---	3.0-4.5	Perched	Nov-Apr	>60	---	Moderate	High.
7D*, 7F*:											
Emporia-----------	C	None---------	---	---	3.0-4.5	Perched	Nov-Apr	>60	---	Moderate	High.
Nevarc------------	C	None---------	---	---	1.5-3.0	Perched	Dec-Apr	>60	---	High-----	High.
8----------------- Eunola	C	None---------	---	---	1.5-2.5	Apparent	Nov-Mar	>60	---	Low-------	High.
9A, 9B------------ Kempsville	B	None---------	---	---	>6.0	---	---	>60	---	Low-------	Moderate.
10---------------- Kenansville	A	None---------	---	---	4.0-6.0	Apparent	Dec-Apr	>60	---	Low-------	High.
11*:											
Kinston-----------	B	Frequent-----	Brief------	Nov-Jun	0-1.0	Apparent	Nov-Jun	>60	---	High-----	High.
Bibb--------------	C	Frequent-----	Brief------	Dec-May	0.5-1.0	Apparent	Dec-Apr	>60	---	High-----	Moderate.
12---------------- Lumbee	B	Rare---------	---	---	0-1.0	Apparent	Nov-Apr	>60	---	High-----	High.
13---------------- Myatt	D	None---------	---	---	0-1.0	Apparent	Nov-Apr	>60	---	High-----	High.
14---------------- Nansemond	C	None---------	---	---	1.5-2.5	Apparent	Dec-Apr	>60	---	Moderate	High.
15---------------- Ochlockonee	B	Frequent-----	Very brief	Dec-Apr	3.0-4.0	Apparent	Dec-Apr	>60	---	Low-------	High.
16---------------- Pactolus	A	None---------	---	---	1.5-3.0	Apparent	Dec-Apr	>60	---	Low-------	High.
17---------------- Pocaty	D	Frequent-----	Very long	Jan-Dec	+1-1.0	Apparent	Jan-Dec	>60	---	High-----	High.
18A, 18B---------- Rumford	B	None---------	---	---	>6.0	---	---	>60	---	Low-------	High.
19A, 19B---------- Slagle	C	None---------	---	---	1.5-3.0	Perched	Nov-Apr	>60	---	Moderate	High.
20A, 20B---------- Suffolk	B	None---------	---	---	>6.0	---	---	>60	---	Moderate	High.

See footnote at end of table.

TABLE 16.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness	Uncoated steel	Concrete
					Ft			In			
21D*, 21F*:											
Suffolk----------	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	High.
Remlik-----------	A	None--------	---	---	4.0-6.0	Perched	Dec-Mar	>60	---	Low------	Moderate.
22B*:											
Udorthents.											
Psamments.											

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 17.--CLASSIFICATION OF THE SOILS

[An asterisk in the first column indicates that the soil is a taxadjunct to the series. See text for a description of those characteristics of the soil that are outside the range of the series]

Soil name	Family or higher taxonomic class
Ackwater	Clayey, mixed, thermic Aquic Paleudults
Bama	Fine-loamy, siliceous, thermic Typic Paleudults
Bethera	Clayey, mixed, thermic Typic Paleaquults
Bibb	Coarse-loamy, siliceous, acid, thermic Typic Fluvaquents
Catpoint	Siliceous, thermic Ultic Udipsamments
*Craven	Clayey, mixed, thermic Aquic Hapludults
Daleville	Fine-loamy, siliceous, thermic Typic Paleaquults
Emporia	Fine-loamy, siliceous, thermic Typic Hapludults
*Eunola	Fine-loamy, siliceous, thermic Aquic Hapludults
Kempsville	Fine-loamy, siliceous, thermic Typic Hapludults
Kenansville	Loamy, siliceous, thermic Arenic Hapludults
Kinston	Fine-loamy, siliceous, acid, thermic Typic Fluvaquents
Lumbee	Fine-loamy over sandy or sandy-skeletal, siliceous, thermic Typic Ochraquults
Myatt	Fine-loamy, siliceous, thermic Typic Ochraquults
Nansemond	Coarse-loamy, siliceous, thermic Aquic Hapludults
Nevarc	Clayey, mixed, thermic Aquic Hapludults
Ochlockonee	Coarse-loamy, siliceous, acid, thermic Typic Udifluvents
Pactolus	Thermic, coated Aquic Quartzipsamments
Pocaty	Euic, thermic Typic Sulfihemists
Psamments	Psamments
Remlik	Loamy, siliceous, thermic Arenic Hapludults
*Rumford	Coarse-loamy, siliceous, thermic Typic Hapludults
Slagle	Fine-loamy, siliceous, thermic Aquic Hapludults
Suffolk	Fine-loamy, siliceous, thermic Typic Hapludults
Udorthents	Udorthents

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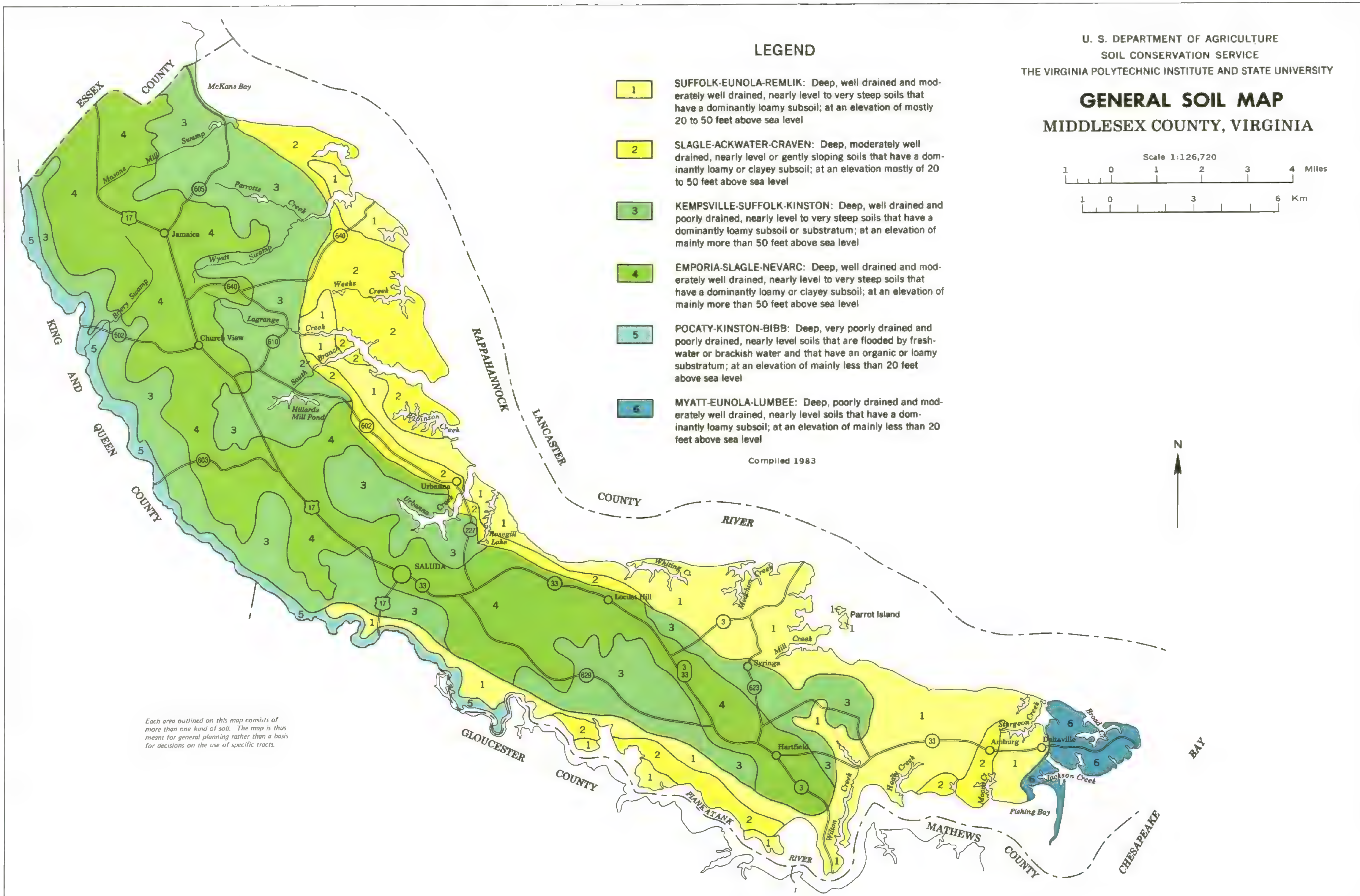
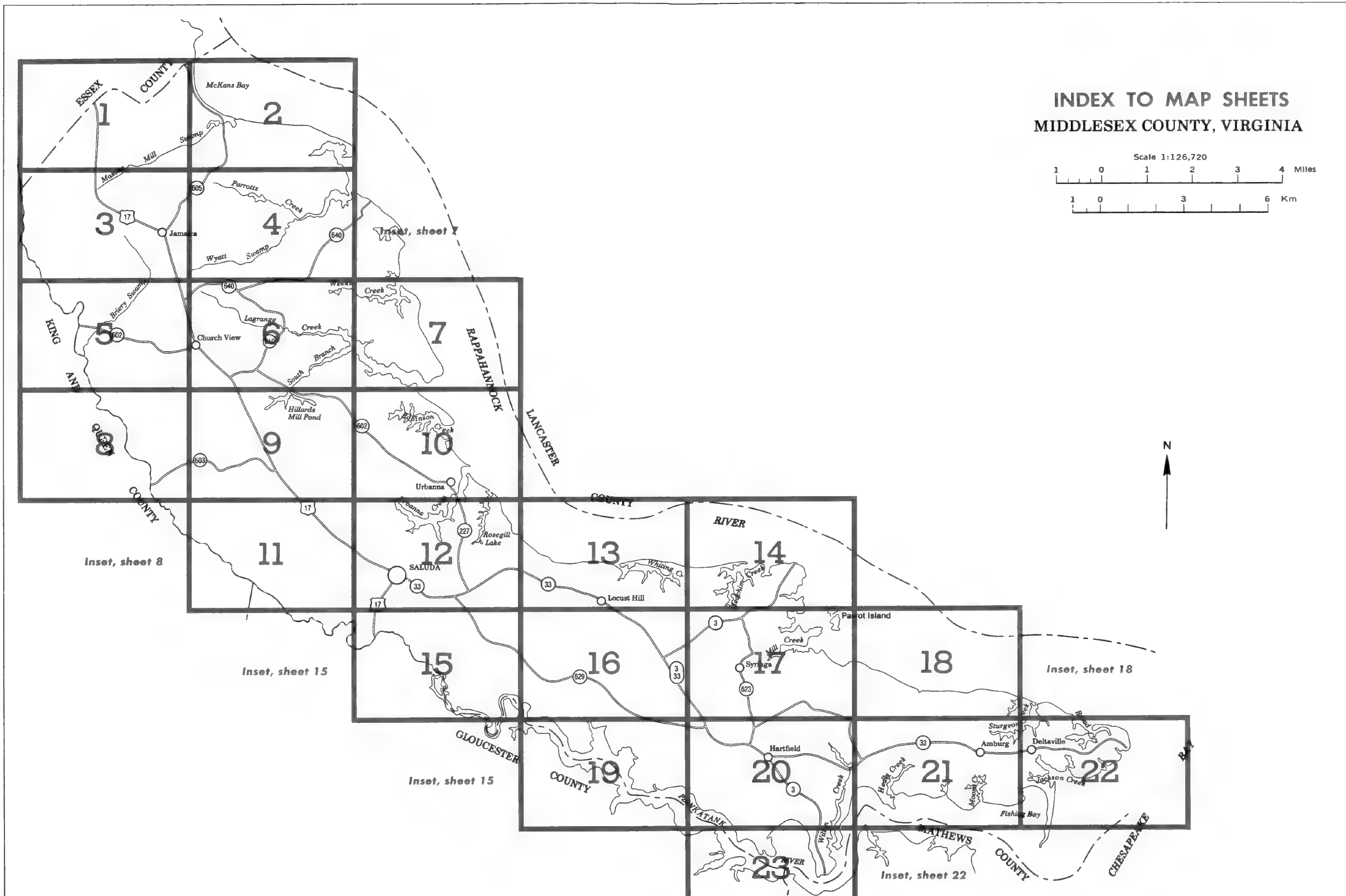

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
THE VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY
GENERAL SOIL MAP
MIDDLESEX COUNTY, VIRGINIA
Scale 1:126,720
1 0 1 2 3 4 Miles
1 0 3 6 Km
LEGEND
1 SUFFOLK-EUNOLA-REMLIK: Deep, well drained and moderately well drained, nearly level to very steep soils that have a dominantly loamy subsoil; at an elevation of mostly 20 to 50 feet above sea level
2 SLAGLE-ACKWATER-CRAVEN: Deep, moderately well drained, nearly level or gently sloping soils that have a dominantly loamy or clayey subsoil; at an elevation mostly of 20 to 50 feet above sea level
3 KEMPSVILLE-SUFFOLK-KINSTON: Deep, well drained and poorly drained, nearly level to very steep soils that have a dominantly loamy subsoil or substratum; at an elevation of mainly more than 50 feet above sea level
4 EMPORIA-SLAGLE-NEVARC: Deep, well drained and moderately well drained, nearly level to very steep soils that have a dominantly loamy or clayey subsoil; at an elevation of mainly more than 50 feet above sea level
5 POCATY-KINSTON-BIBB: Deep, very poorly drained and poorly drained, nearly level soils that are flooded by freshwater or brackish water and that have an organic or loamy substratum; at an elevation of mainly less than 20 feet above sea level
6 MYATT-EUNOLA-LUMBEE: Deep, poorly drained and moderately well drained, nearly level soils that have a dominantly loamy subsoil; at an elevation of mainly less than 20 feet above sea level
Compiled 1983
N
ESSEX COUNTY
KING AND QUEEN COUNTY
GLOUCESTER COUNTY
RAPPAHANNOCK RIVER
LANCASTER COUNTY
MATHEWS COUNTY
PIANKATANK RIVER
CHESAPEAKE BAY
McKans Bay
Masons Mill Swamp
Parrotts Creek
Jamaica
Wyatt Swamp
Briery Swamp
Lagrange Creek
Weeks Creek
Church View
South Branch
Hillards Mill Pond
Robinson Creek
Urbanna
Urbanna Creek
Rosegill Lake
SALUDA
Whiting Cr.
Meachim Creek
Locust Hill
Parrot Island
Mill Creek
Syringa
Hartfield
Healy Creek
Sturgeon Creek
Amburg
Deltaville
Broad Cr.
Jackson Creek
Fishing Bay
Moore Cr.
Wilton Creek
Each area outlined on this map consists of more than one kind of soil. The map is thus meant for general planning rather than a basis for decisions on the use of specific tracts.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MIDDLESEX COUNTY, VIRGINIA
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Km
N
ESSEX COUNTY
KING AND QUEEN COUNTY
RAPPAHANNOCK RIVER
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GLOUCESTER COUNTY
MATHEWS COUNTY
PIANKATANK RIVER
CHESAPEAKE BAY
McKans Bay
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SOIL LEGEND

Publication symbols consist of numbers or a combination of numbers and letters (e.g. 4, 5B, 7F). The initial numbers represent the kind of soil. A capital letter of A, B, C, D, E, or F following these numbers indicates the class of slope. Symbols without a slope letter are for nearly level soils, soils named for higher categories, or for miscellaneous areas.

SYMBOL	NAME
1	Ackwater silt loam
2B	Bama loam, 2 to 6 percent slopes
3	Bethera and Daleville soils
4	Catpoint loamy sand
5A	Craven silt loam, 0 to 2 percent slopes
5B	Craven silt loam, 2 to 6 percent slopes
6A	Emporia loam, 0 to 2 percent slopes
6B	Emporia loam, 2 to 6 percent slopes
7D	Emporia-Nevarc complex, 6 to 15 percent slopes
7F	Emporia-Nevarc complex, 15 to 45 percent slopes
8	Eunola loam
9A	Kempsville sandy loam, 0 to 2 percent slopes
9B	Kempsville sandy loam, 2 to 6 percent slopes
10	Kenansville fine sand
11	Kinston-Bibb complex
12	Lumbee silt loam
13	Myatt loam
14	Nansemond loamy fine sand
15	Ochlockonee silt loam
16	Pactolus loamy fine sand
17	Pocaty muck
18A	Rumford fine sandy loam, 0 to 2 percent slopes
18B	Rumford fine sandy loam, 2 to 6 percent slopes
19A	Slagle silt loam, 0 to 2 percent slopes
19B	Slagle silt loam, 2 to 6 percent slopes
20A	Suffolk fine sandy loam, 0 to 2 percent slopes
20B	Suffolk fine sandy loam, 2 to 6 percent slopes
21D	Suffolk-Remlik complex, 6 to 15 percent slopes
21F	Suffolk-Remlik complex, 15 to 45 percent slopes
22B	Udorthents and Psamments, gently sloping

CONVENTIONAL AND SPECIAL SYMBOLS LEGEND

CULTURAL FEATURES

BOUNDARIES

- National, state or province
- County or parish
- Minor civil division
- Reservation (national forest or park, state forest or park, and large airport)
- Land grant
- Limit of soil survey (label)
- Field sheet matchline & neatline

AD HOC BOUNDARY (label) — Hedley Airstrip

- Small airport, airfield, park, oilfield, cemetery, or flood pool — FLOOD POOL LINE

STATE COORDINATE TICK

LAND DIVISION CORNERS (sections and land grants)

ROADS

- Divided (median shown if scale permits)
- Other roads
- Trail

ROAD EMBLEM & DESIGNATIONS

- Interstate — 21
- Federal — 173
- State — 28
- County, farm or ranch — 1283

RAILROAD

POWER TRANSMISSION LINE (normally not shown)

PIPE LINE (normally not shown)

FENCE (normally not shown)

LEVEES

- Without road
- With road
- With railroad

DAMS

- Large (to scale)
- Medium or small — water, w

PITS

- Gravel pit
- Mine or quarry

MISCELLANEOUS CULTURAL FEATURES

- Farmstead, house (omit in urban areas)
- Church
- School
- Indian mound (label) — Indian Mound
- Located object (label) — Tower
- Tank (label) — Gas
- Wells, oil or gas
- Windmill
- Kitchen midden

WATER FEATURES

DRAINAGE

- Perennial, double line
- Perennial, single line
- Intermittent
- Drainage end
- Canals or ditches
  - Double-line (label) — CANAL
  - Drainage and/or irrigation

LAKES, PONDS AND RESERVOIRS

- Perennial — water, w
- Intermittent — int, i

MISCELLANEOUS WATER FEATURES

- Marsh or swamp (2 acres or less)
- Spring
- Well, artesian
- Well, irrigation
- Wet spot

SPECIAL SYMBOLS FOR SOIL SURVEY

SOIL DELINEATIONS AND SYMBOLS — 6B, 7D

ESCARPMENTS

- Bedrock (points down slope)
- Other than bedrock (points down slope)

SHORT STEEP SLOPE

GULLY

DEPRESSION OR SINK

SOIL SAMPLE SITE (normally not shown) — S

MISCELLANEOUS

- Blowout
- Clay spot (2 acres or less)
- Gravelly spot
- Gumbo, slick or scabby spot (sodic)
- Dumps and other similar non soil areas (2 acres or less)
- Prominent hill or peak
- Rock outcrop (includes sandstone and shale)
- Saline spot
- Sandy spot (2 acres or less)
- Severely eroded spot (2 acres or less)
- Slide or slip (tips point upslope)
- Stony spot, very stony spot
- Undelineated bodies of Udorthents and Psamments, gently sloping, of 2 acres or less

1

N

1 Mile
5 000 Feet
Scale 1:15 840

MIDDLESEX COUNTY, VIRGINIA NO. 1

This map is compiled on 1977 aerial photography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown are approximately positioned.

MIDDLESEX COUNTY, VIRGINIA — SHEET NUMBER 10

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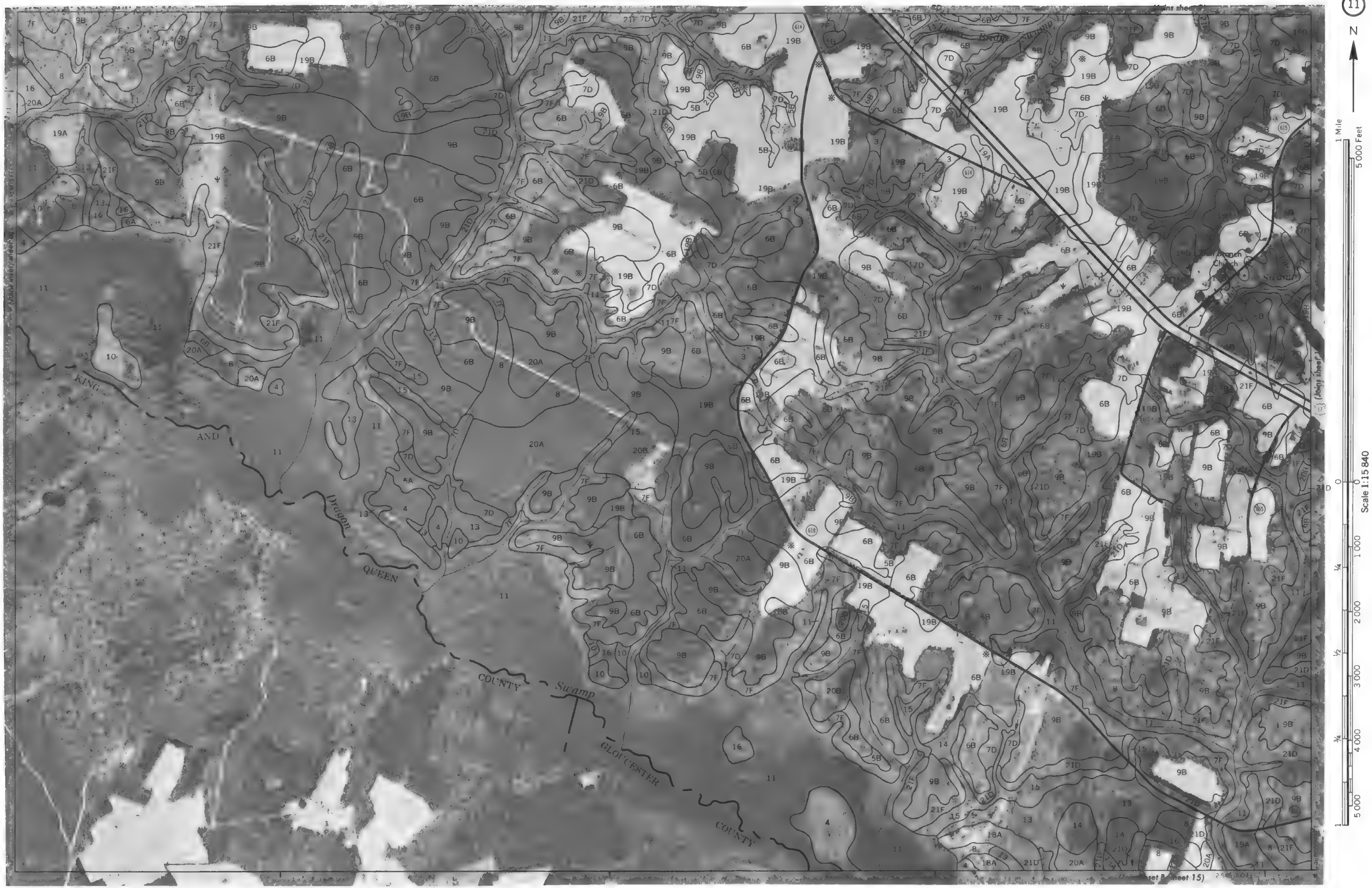
MIDDLESEX COUNTY, VIRGINIA NO. 10



MIDDLESEX COUNTY, VIRGINIA NO. 11

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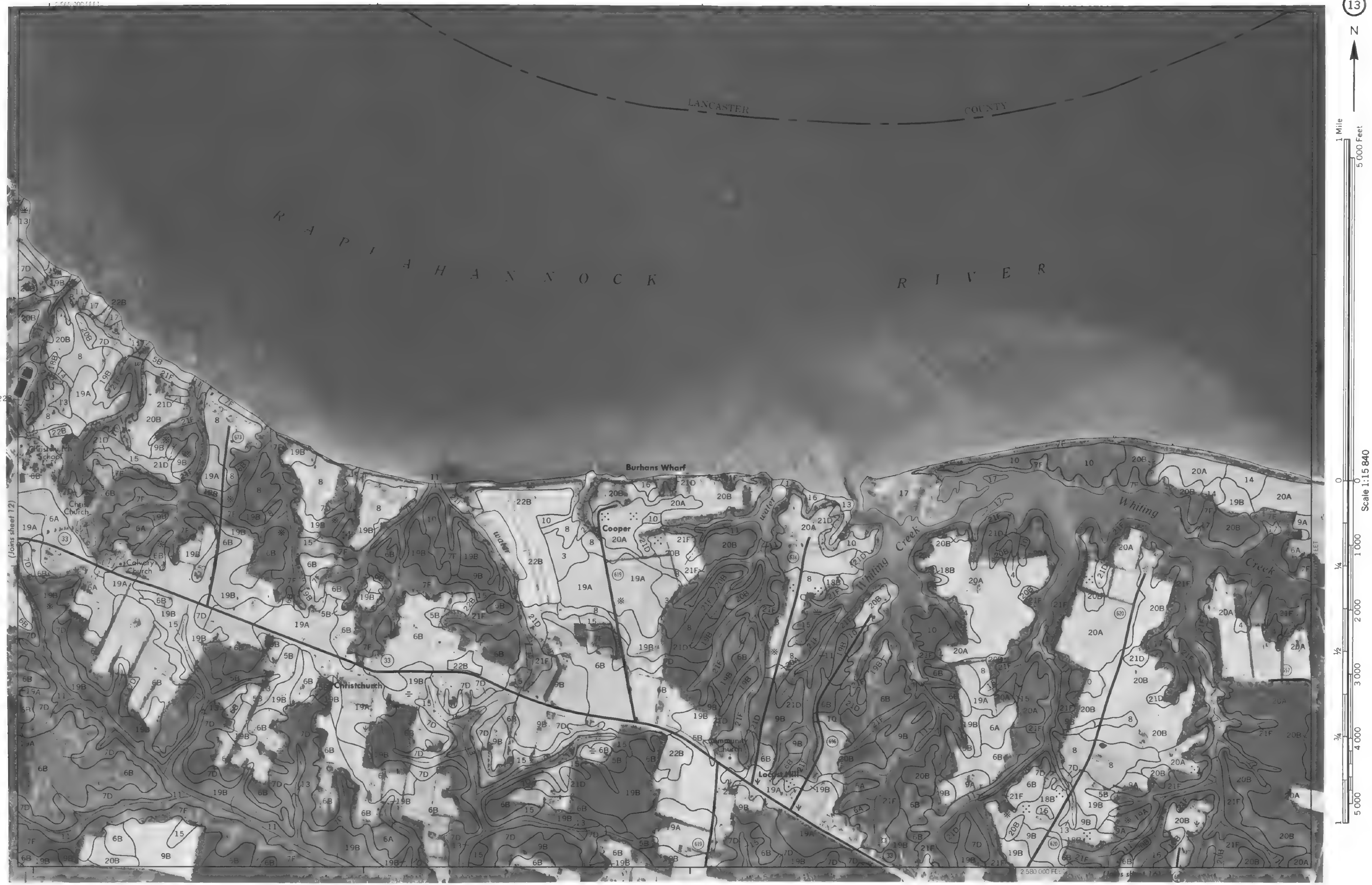
MIDDLESEX COUNTY, VIRGINIA — SHEET NUMBER 12

MIDDLESEX COUNTY, VIRGINIA NO. 12


13
N
LANCASTER COUNTY
RAPPAHANNOCK RIVER
Burhans Wharf
Cooper
Whiting Creek
Christchurch
Calvary Church
Locust Hill
(Joins sheet 12)
Scale 1:15 840
1 Mile
5 000 Feet
2 580 000 FEET

MIDDLESEX COUNTY, VIRGINIA — SHEET NUMBER 14

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MIDDLESEX COUNTY, VIRGINIA NO. 15

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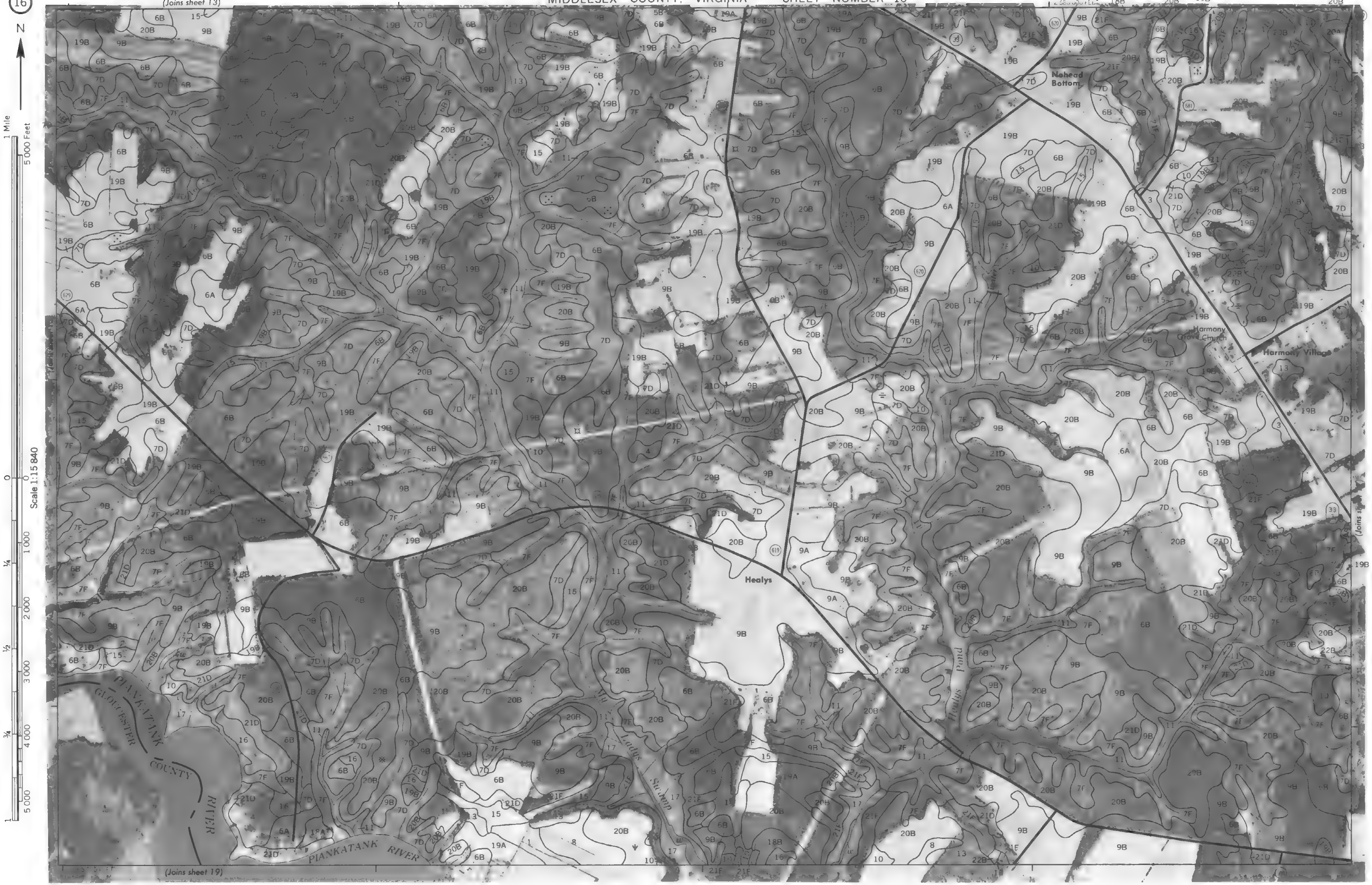
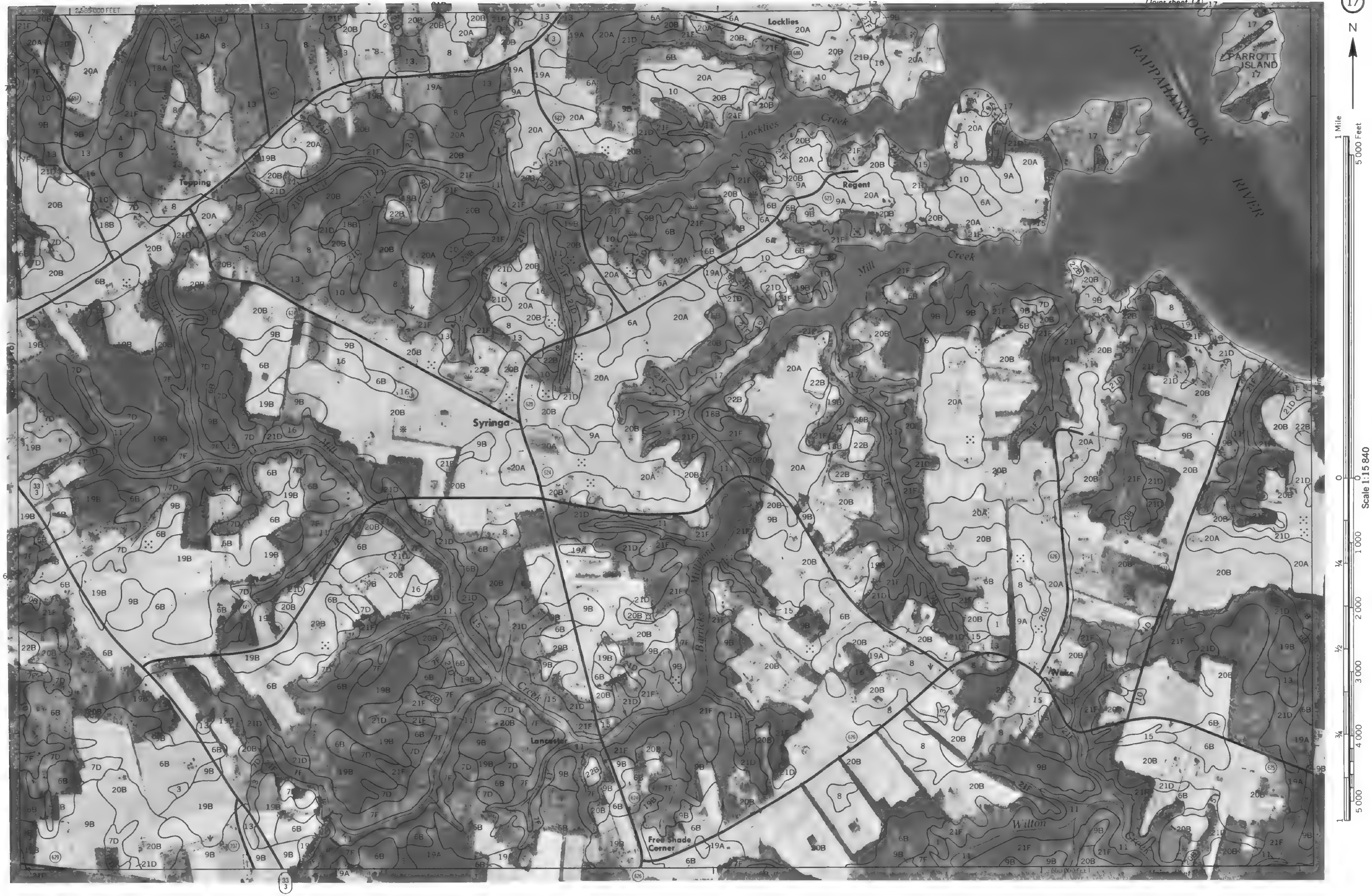
MIDDLESEX COUNTY, VIRGINIA — SHEET NUMBER 16

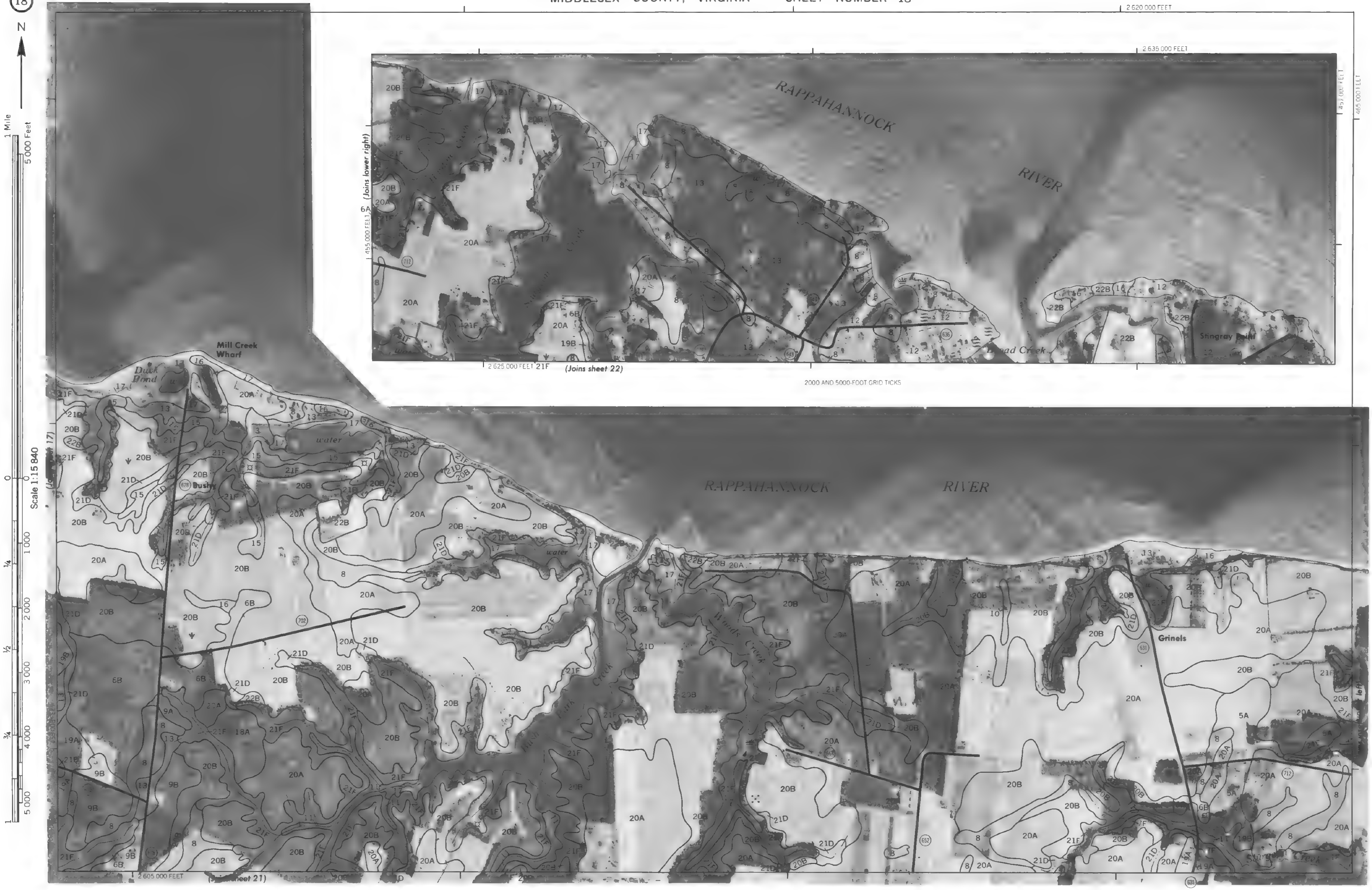


MIDDLESEX COUNTY, VIRGINIA NO. 16



MIDDLESEX COUNTY, VIRGINIA NO. 17

This map is compiled on 1977 aerial photography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



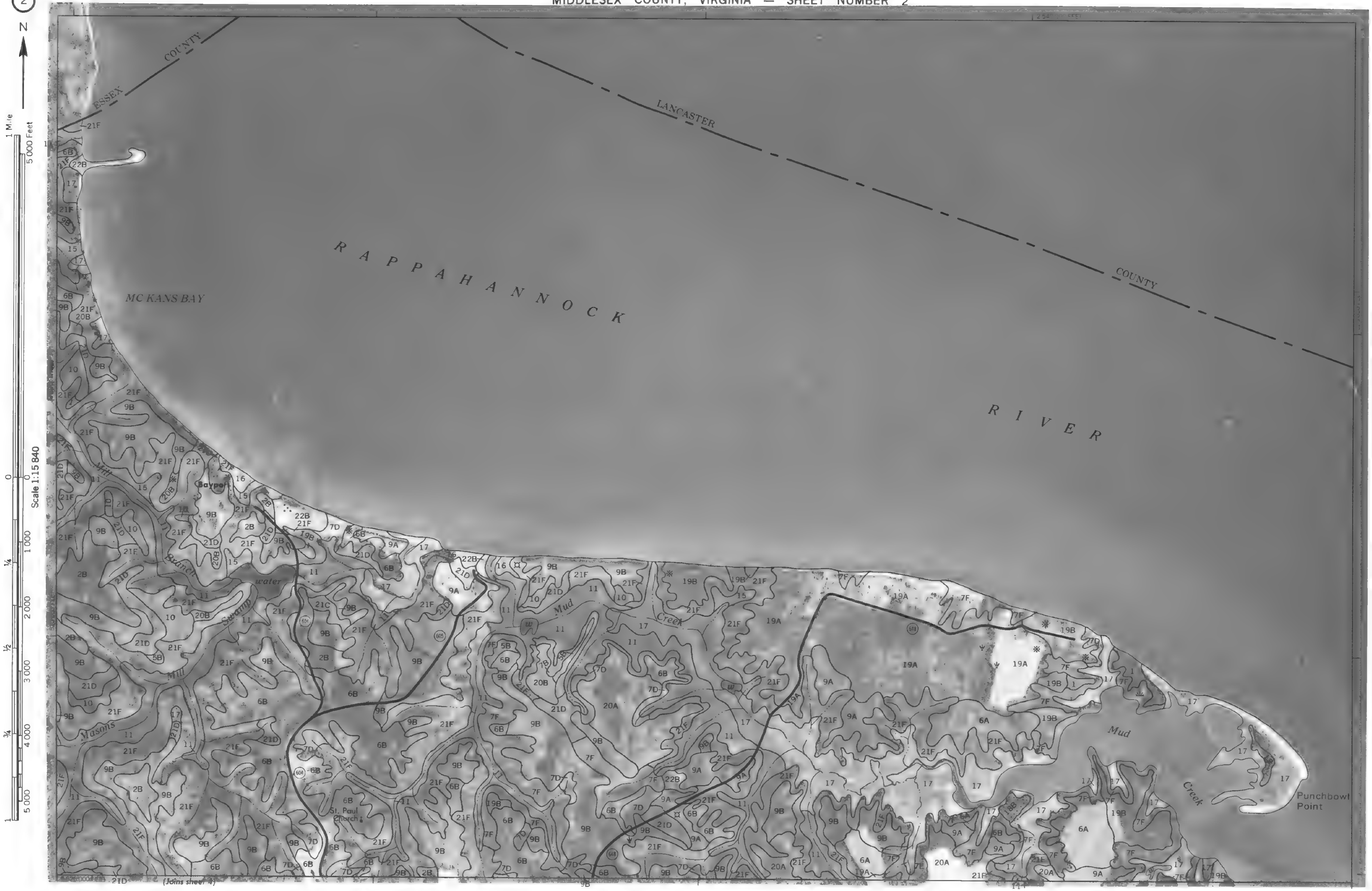
MIDDLESEX COUNTY, VIRGINIA NO. 18

MIDDLESEX COUNTY, VIRGINIA — SHEET NUMBER 19

MIDDLESEX COUNTY, VIRGINIA NO. 19

This map is compiled on 1977 aerial photography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and division corners, if shown, are approximately positioned.

MIDDLESEX COUNTY, VIRGINIA — SHEET NUMBER 2



This map is compiled on 1977 aerial photography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.
MIDDLESEX COUNTY, VIRGINIA NO. 2

MIDDLESEX COUNTY, VIRGINIA — SHEET NUMBER 20

This map is compiled on 1977 aerial photography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MIDDLESEX COUNTY, VIRGINIA NO. 20

MIDDLESEX COUNTY, VIRGINIA NO. 21

This map is compiled on 1977 aerial photography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MIDDLESEX COUNTY, VIRGINIA — SHEET NUMBER 22

MIDDLESEX COUNTY, VIRGINIA NO. 22

MIDDLESEX COUNTY, VIRGINIA NO. 23

This map is compiled on 1977 aerial photography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown are approximately positioned.

MIDDLESEX COUNTY, VIRGINIA — SHEET NUMBER 3

MIDDLESEX COUNTY, VIRGINIA NO. 3

This map is compiled on 1977 aerial photography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

MIDDLESEX COUNTY, VIRGINIA — SHEET NUMBER 4

This map is compiled on 1977 aerial photography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
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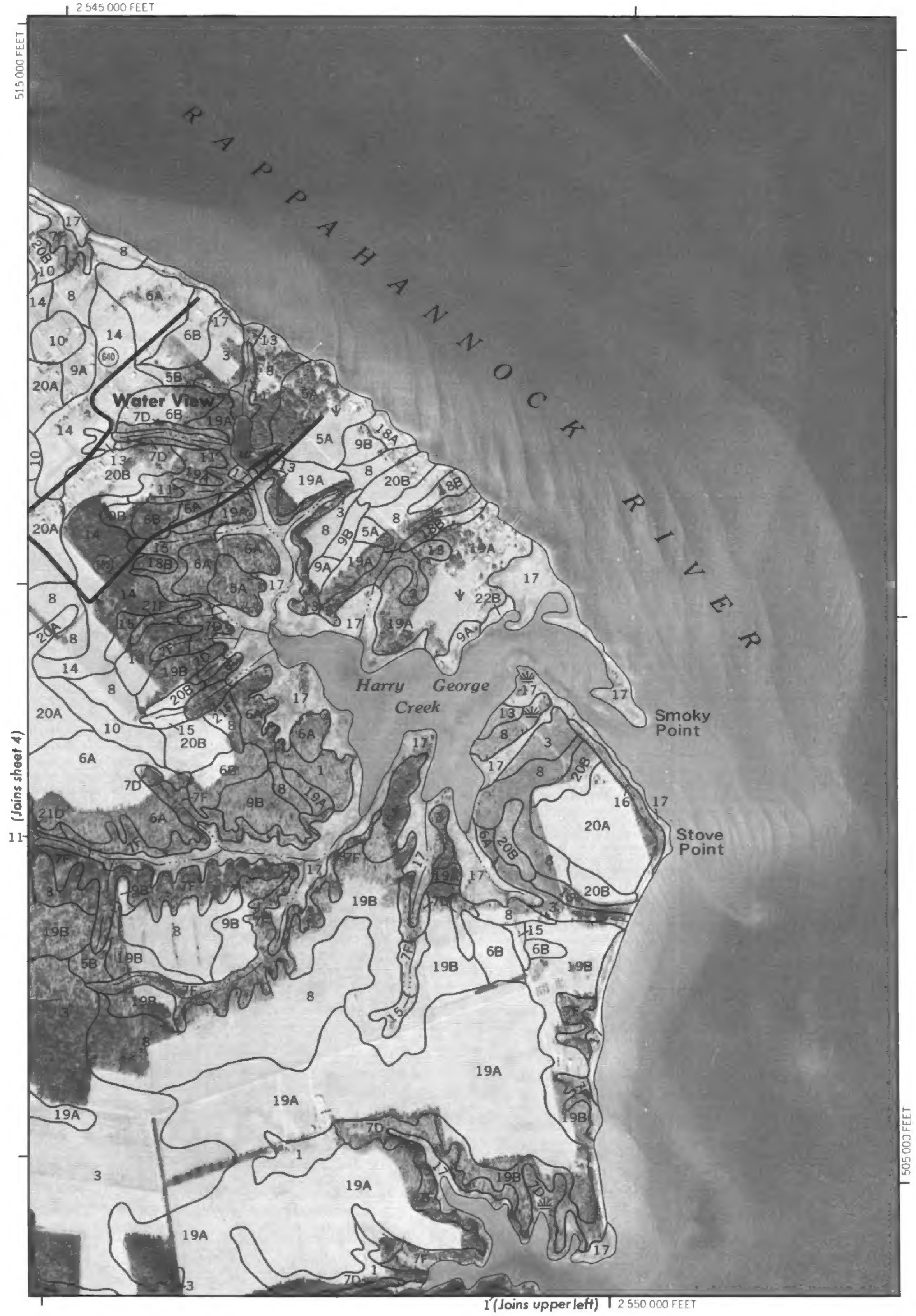
MIDDLESEX COUNTY, VIRGINIA NO. 4

MIDDLESEX COUNTY, VIRGINIA NO. 5

This map is compiled on 1977 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

(7)



MIDDLESEX COUNTY, VIRGINIA NO. 7

This map is compiled on 1977 aerial photography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown are approximately positioned.

N

1 Mile — 5 000 Feet

Scale 1:15 840

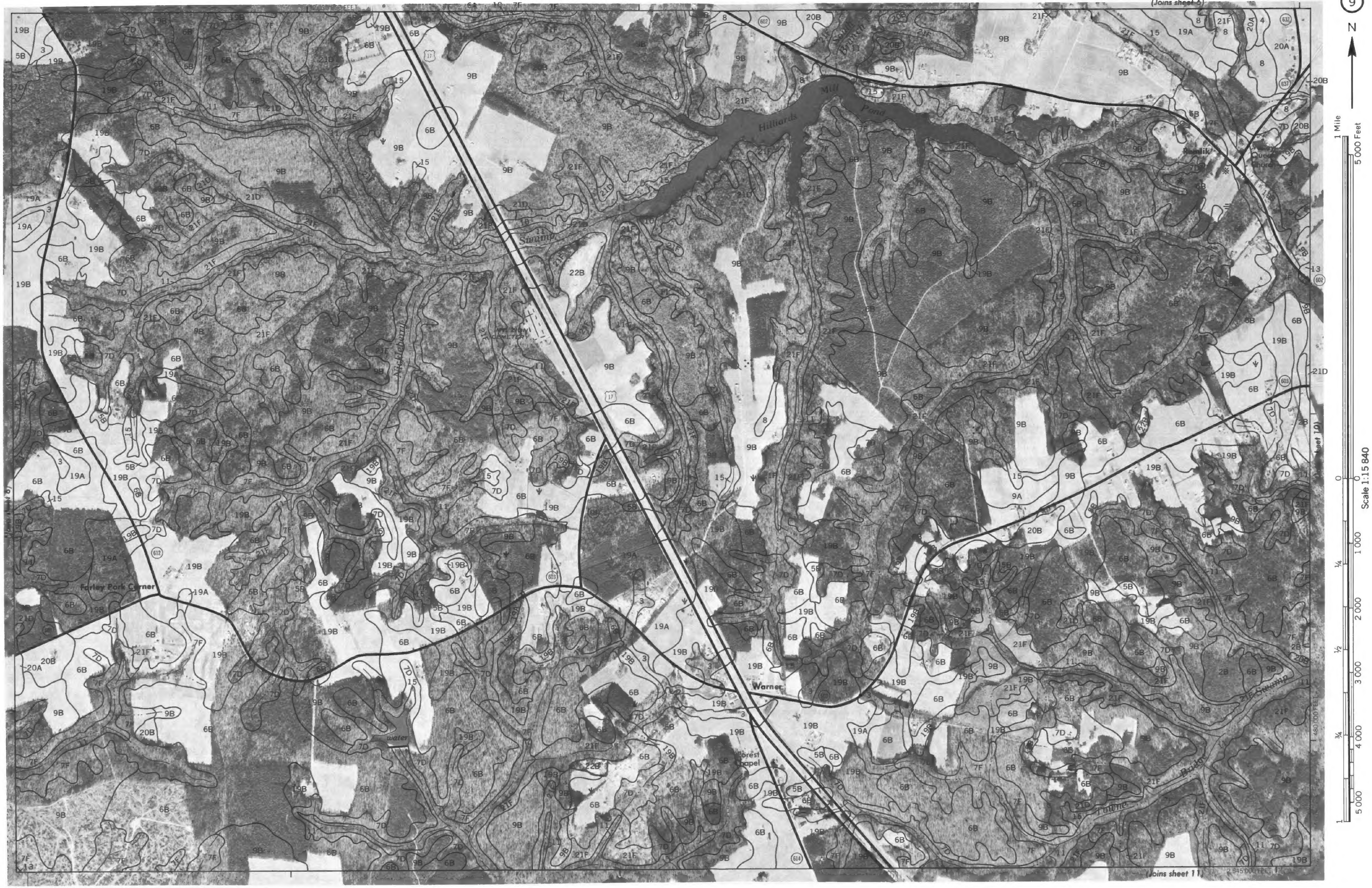
MIDDLESEX COUNTY, VIRGINIA — SHEET NUMBER 8

N

1 Mile
5 000 Feet
Scale 1:15 840
0 ¼ ½ ¾ 1
0 1 000 2 000 3 000 4 000 5 000

This map is compiled on 1977 aerial photography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MIDDLESEX COUNTY, VIRGINIA NO. 8



MIDDLESEX COUNTY, VIRGINIA NO. 9

This map is compiled on 1977 aerial photography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.